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The University of Michigan Astronomy Library

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For related information see also *Astronautics*.

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For related information see also *34 Fluid Mechanics and Heat Transfer*.

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Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

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07 AIRCRAFT PROPULSION AND POWER 3855

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

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For related information see also *14 Ground Support Systems and Facilities (Space)*.

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Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

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For related information see also *09 Research and Support Facilities (Air)*.

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Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

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For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 3861

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Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 3969
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 3969
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION N.A.
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) 3970

89 ASTRONOMY 3982
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 3986
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 3989
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 3992
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 3993
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL 3995

Note: N.A. means that no abstracts were assigned to this category for this issue.

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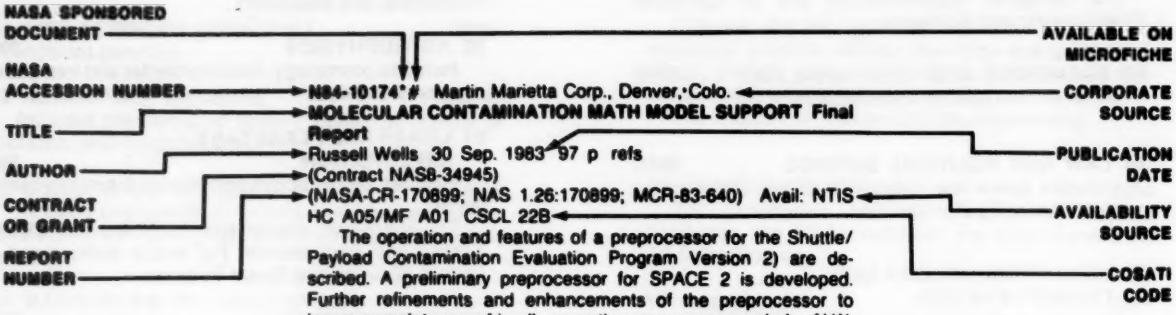
TYPICAL CITATION AND ABSTRACT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N84-10174*# Martin Marietta Corp., Denver, Colo.
MOLECULAR CONTAMINATION MATH MODEL SUPPORT Final Report
Russell Wells 30 Sep. 1983 97 p refs
(Contract NAS8-34945)
(NASA-CR-170899; NAS 1.26:170899; MCR-83-640) Avail: NTIS HC A05/MF A01 CSCL 22B
The operation and features of a preprocessor for the Shuttle/ Payload Contamination Evaluation Program Version 2) are described. A preliminary preprocessor for SPACE 2 is developed. Further refinements and enhancements of the preprocessor to insure complete user friendly operation, are recommended. N.W.

VOLUME 22 NUMBER 24/DECEMBER 23, 1984

Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N84-34394# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
NOTICE FOR AIRMEN, PART 2. INDEX OF APPROVED MANUFACTURING OPERATIONS FOR AERONAUTICAL APPLIANCES ACCORDING TO PARAGRAPH 18 OF TEST PROCEDURES FOR AERONAUTICAL APPLIANCES [NACHRICHTEN FUER LUFTFAHRER, TEIL 2. VERZEICHNIS DER NACH ABSATZ 18 DER PRUEFORDNUNG FUER LUFTFAHRTGERAET (LUFTGERPO) ANERKANNTEN HERSTELLERBETRIEBE VON LUFTFAHRTGERAET]
25 May 1984 7 p refs In GERMAN
(NfL-II-38/84) Avail: NTIS HC A02/MF A01

An updated summary of approved manufacturing operations for aeronautical appliances as of 31 Dec. 1983 is presented.
Author (ESA)

N84-34395# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
NOTICE FOR AIRMEN, PART 2. INDEX OF APPROVED AERONAUTICAL ENGINEERING OPERATIONS AND OF INDEPENDENT INSPECTORS ACCORDING TO PARAGRAPH 33 OF TEST PROCEDURES FOR AERONAUTICAL APPLIANCES [NACHRICHTEN FUER LUFTFAHRER, TEIL 2. VERZEICHNIS DER NACH 33 ABSATZ DER PRUEFORDNUNG FUER LUFTFAHRTGERAET ANERKANNTEN LUFTFAHRTTECHNISCHEN BETRIEBE UND DER SELBSTAENDIGEN PRUEFER VON LUFTFAHRTGERAET]
24 May 1984 46 p refs In GERMAN
(NfL-II-39/84) Avail: NTIS HC A03/MF A01

An updated summary of approved aeronautical engineering operations and of independent inspectors as of 31 Dec. 1983 is given.
Author (ESA)

N84-34396# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
FLIGHT TEST TECHNIQUES
Loughton, England Jul. 1984 367 p refs In ENGLISH and FRENCH Conf. held in Lisbon, 2-5 Apr. 1984
(AGARD-CP-373; ISBN-92-835-0359-7) Avail: NTIS HC A16/MF A01

Flight testing techniques that evaluate flight control characteristics, aerodynamic characteristics, and avionics/weapons systems are presented. The analyses cover topics such as lift and drag quantification, autopilot and navigation equipment tests, external stores flight testing, and weapons system testing and integration. For individual titles, see N84-34397 through N84-34421.

N84-34397# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF EXTERNAL STORE DRAG c05
K. Lutz and R. Matecki *In* AGARD Flight Test Tech. Jul. 1984 9 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The evaluation of external stores concerns single store configurations and double store configurations. The necessary considered further work for completing external store statistical basic data is listed. The external store drag is evaluated in a classical manner for all configurations and configuration components beginning with the clean aircraft as first reference configuration and than evaluating step by step additional components (e.g., gun-pod, pylons, tanks e.a.). The main effort is directed on underwing stores, as the ALPHA-Jet has only one under-fuselage station for a gun-pod.
M.A.C.

N84-34398# British Aerospace Aircraft Group, Preston (England).
THE FLIGHT TEST OF AN AUTOMATIC SPIN PREVENTION SYSTEM c08
P. S. Butcher and K. McKay *In* AGARD Flight Test Tech. Jul. 1984 11 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The flight testing of the Spin Prevention and Incidence Limiting System (SPILS) now fitted to the Tornado aircraft is investigated. The trial is carried out in parallel with the conventional stalling and spinning trial and the special aircraft equipment and test procedures are common to both trial and is considered in some detail. The SPILS flight testing is described with and without stores, and describes the reasons for the control law modifications required to fine tune the performance of the system.
M.A.C.

N84-34399# Air Force Flight Test Center, Edwards AFB, Calif.
HIGH ANGLE OF ATTACK TEST AND EVALUATION TECHNIQUES FOR THE 1980S c05
Gerald L. Jones *In* AGARD Flight Test Tech. Jul. 1984 13 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The principles that guide the development of stall/post stall/spin flight test demonstration specification MIL-S-83691 and at how recent flight test experiences at the AFFTC have modified and expanded upon those ideas over the past decade are examined. Sixteen high angle-of-attack (AOA) flight test programs on four different series of fighter/attack aircraft are completed. The basic objectives of each one of those programs emphasized the determination of departure characteristics and the development of methods for departure prevention and spin avoidance.
M.A.C.

N84-34400# National Aerospace Lab., Amsterdam (Netherlands).
DETERMINATION OF PERFORMANCE AND STABILITY CHARACTERISTICS FROM DYNAMIC MANOEUVRES WITH A TRANSPORT AIRCRAFT USING PARAMETER IDENTIFICATION TECHNIQUES c05
J. H. Breeman, L. J. J. Erkelens, and A. M. H. Nieuwpoort *In* AGARD Flight Test Tech. Jul. 1984 18 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

A flight test program is executed with the Fokker F28 transport aircraft to investigate whether it is possible to determine performance and stability characteristics from dynamic maneuvers using

parameter identification techniques, with sufficient accuracy for certification purposes. A research moving base flight simulator, programmed with the F28 aerodynamic model derived from conventional flight tests and wind-tunnel data, is used to select an optimal set of maneuvers from which the desired characteristics could be determined with a satisfactory degree of accuracy. Flight test data is analyzed, using the Two-Step method. This method starts by reconstructing the aircraft flight path as the first step. The second step is the calculation of all aerodynamic coefficients using straightforward regression analysis techniques. The advantage of this method over the more often used maximum likelihood estimation methods is that a large number of alternative non-linear aerodynamic models can be investigated in a short time using an interactive program. The flight test results are compared with results derived from conventional test programs. From this comparison it is clear that the data is sufficiently accurate. M.A.C.

N84-34401# Grumman Data Systems Corp., Calverton, N.Y.
APPLICATION OF ADVANCED PARAMETER IDENTIFICATION METHODS FOR FLIGHT FLUTTER DATA ANALYSIS WITH COMPARISONS TO CURRENT TECHNIQUES **c08**
Henry J. Perangelo and Paul R. Waisanen (Grumman Aerospace Corp., Calverton, N.Y.) *In* AGARD Flight Test Tech. Jul. 1984 29 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The implementation and evaluation of advanced parameter identification software for use in flutter test data processing operations is investigated. The maximum likelihood parameter identification algorithm is used in conjunction with a detailed physical aeroelastic aircraft model to perform optimal flutter test data analysis. Extended Kalman filtering is considered for eventual use as a second advanced parameter identification method. A mathematical description of the advanced parameter identification approach and least-squares flutter analysis procedures are presented. A comparison between this current analysis capability and prototype code for the maximum likelihood parameter identification algorithm on response data excited randomly (via atmospheric turbulence) and by swept shaker inputs indicates a significant improvement in analysis results with the advanced method. M.A.C.

N84-34402# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Flight Test Department.
A TECHNIQUE TO DETERMINE LIFT AND DRAG POLARS IN FLIGHT **c02**
A. Knaus *In* AGARD Flight Test Tech. Jul. 1984 14 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

Performance trials of the European combat aircraft Tornado concentrated on the systematic measurement of lift and drag polars. Such polars were successfully measured by means of well-adapted test instrumentation, a data reduction system, and a high calibration standard of the aircraft and engines. The use of a certain combination of steady state and dynamic test maneuvers resulted in a drastic reduction in the amount of flight time required to obtain sufficient data for the determination of the zero lift drag, induced drag characteristics, and drag increments due to aircraft configuration changes. Flight test results are presented which demonstrate the advantage of the test technique utilized and the high data quality achieved. R.S.F.

N84-34403# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
FLIGHT TESTING A DIGITAL FLIGHT CONTROL SYSTEM: ISSUES AND RESULTS **c08**
Brian W. VanVliet *In* AGARD Flight Test Tech. Jul. 1984 10 p ref (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The AFTI/F-16 advanced development program modified a F-16A to be a testbed for evaluating new flight control related technologies. Some of the technologies developed on this program are: a triplex digital fly-by-wire flight control system which operates asynchronously, an analog independent backup unit (IBU), eight separate digital task-tailored control laws, and six decoupled controller options. Included among these task-tailored modes are normal operation modes, air-to-air combat modes, and air-to-surface combat modes. Two of these modes, the normal mode and the IBU, were flight tested on the AFTI/F-16 itself, and the flight test results were different from any of the simulators' predicted results. Several flight test issues are discussed in terms of how they were resolved and their effect especially on the aircraft handling qualities. Specific topics considered are: the IBU, the effect of the asynchronous computer operation and system redundancy management on the flight control laws and flight testing, and some handling qualities problems with combination coupled/decoupled control laws. R.S.F.

N84-34404# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Flight Test Department.
AIRCRAFT TESTS IN THE CLEARANCE PROGRAM FOR THE USE OF A COMBAT AIRCRAFT FROM A RUNWAY AFTER DAMAGE REPAIR **c05**
Wolfgang Seidel *In* AGARD Flight Test Tech. Jul. 1984 16 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The requirements of the repair quality of a damaged runway depend highly on the design capabilities and the strength of an aircraft and its undercarriage. This makes accurate knowledge of the behavior of the aircraft on non flat surfaces necessary and it is standard practice to develop a computer model of the aircraft and its undercarriage for analytical coverage of all operational cases. This analytical model requires comprehensive verification in tests; the tests are additionally necessary to optimize pilot techniques for the use of the aircraft under such conditions with minimum risk. Tests are described which were performed with a combat aircraft on a runway where mat repair was simulated. A description is given of the test setup, and the reasons for the selection of test configurations and test cases are discussed. Test instrumentation, data acquisition, and data processing are briefly described along with the test techniques which were used to meet predetermined test conditions. Examples of test results are presented and compared with predictions. A discussion of unpredicted results highlights the need for accurate test performance. Desirable improvements in measuring techniques and pilot supporting test equipment are considered. R.S.F.

N84-34405# Aeroplane and Armament Experimental Establishment, Boscombe Down (England).
THE HANDLING AND PERFORMANCE TRIALS NEEDED TO CLEAR AN AIRCRAFT TO ACT AS A RECEIVER DURING AIR-TO-AIR REFUELLING **c05**
J. Bradley *In* AGARD Flight Test Tech. Jul. 1984 16 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

A brief description is given of the air to air refueling equipment and techniques presently used in the RAF. The handling and performance tests needed to clear a new receiver type aircraft are described, together with some of the results obtained when large transport aircraft are used in the receiver role. R.S.F.

N84-34406# Royal Aircraft Establishment, Farnborough (England).
REFERENCE SYSTEMS FOR THE EVALUATION OF DEAD-RECKONING NAVIGATION EQUIPMENT **c04**
R. F. Stokes and S. G. Smith *In* AGARD Flight Test Tech. Jul. 1984 17 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

Aircraft dead reckoning navigation systems present particular problems in their assessment, and diagnosis in development where a continuous measurement of their error pattern is required. The need for long range, long duration flights with a continuous high accuracy reference led to the development of an integrated navigation system. The recorded data is processed post-flight in a Kalman filter which is used to estimate the inertial system errors. The final reference is formed by compensating the inertial outputs for these errors and has the properties of high accuracy, low noise, and continuous availability. Although simple in concept the implementation of such a scheme is complex. The major problem

lies in constructing suitable mathematical models of the various equipments, and the technique of pre-processing is described. The second difficult area is that of obtaining the statistical information regarding the performance of the equipments in a form suitable for inclusion in the models. Although the reference is produced off-line, it is possible to implement the techniques on-line. R.S.F.

N84-34407# Aeritalia S.p.A., Caselle Torinese (Italy). Combat Aircraft Group.
AUTOPILOT PERFORMANCE EVALUATION TORNADO EXPERIENCE AND FUTURE APPLICATIONS c08
R. Carabelli and R. Pelissero *In* AGARD Flight Test Tech. Jul. 1984 17 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The Tornado autopilot system performance was evaluated. Problems affecting equipments, control laws, system integration were studied. A digital processor to analyze data from fast data transmission lines and an avionic integration rig with real time closed loop simulation capability were employed. New facilities tailored to cover as much as possible of weapon system testing needs are developed to cope with requirements from oncoming projects which rely upon more advanced technologies. Trends for next trials conduct are discussed and engineering activities and ground facilities needs like simulation and system rig, required to support flight testing of prototype avionic systems are outlined. E.A.K.

N84-34408# Royal Aircraft Establishment, Bedford (England).
ASSESSING PILOT WORKLOAD IN FLIGHT c54
Alan H. Roscoe *In* AGARD Flight Test Tech. Jul. 1984 13 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

A method by which a pilot's heart rate can be recorded to support, or occasionally question, his subjective rating of workload is described. Examples from RAE Bedford trials are presented to illustrate the technique, and the BAe 146 crew complement certification exercise is described. A flight experiment which compares heart rate levels and workload ratings in a more scientific manner is described. The rationale for using heart rate in this way is discussed. E.A.K.

N84-34409# Naval Air Test Center, Patuxent River, Md. Systems Engineering Test Directorate.
SIMULATION APPLIED TO THE AVIONICS SYSTEM TESTING IN THE F/A-18 c06
Andrew C. Cruce *In* AGARD Flight Test Tech. Jul. 1984 9 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The use of simulation in support of flight test which can be used to leverage the flight test available in many programs to adequately cover the complex test requirements of modern systems is discussed. The simulation facility is designed around the multiplex data bus structure found in modern aircrafts. This architecture makes the simulation problem easier but is not a necessary condition for the application of these techniques to support flight test. However, for nonmultiplex bus systems the simulation is by nature more single purpose and the difficulty in changing the simulation facility from one aircraft type to another is greatly increased. The facility is used to support F/A-18 and AV-8B avionics system testing. The facility is being expanded to support flight system and flight control computer testing for the F/A-18, AV-8B, F-4S, F-14, and X-29 aircraft. It is asserted that the use of simulation to supplement flight test offers the opportunity to test highly complex and highly integrated weapons systems within the level of test assets expected to be available in future programs. E.A.K.

N84-34410# Aeroplane and Armament Experimental Establishment, Boscombe Down (England).
FLIGHT TEST TECHNIQUES EMPLOYED IN THE NIMROD MR MK 2 WEAPON SYSTEM PERFORMANCE TRIALS c05
L. M. Dutton *In* AGARD Flight Test Tech. Jul. 1984 13 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The potential accuracy of the Nimrod's ASW systems which was matched by the precision of trial data collection, in the air and on and below the sea surface is shown. To gain such precision, the aircraft were instrumented and the majority of the trials were conducted at the Atlantic Undersea Test and Evaluation Center (AUTEC) Range. The trial analysis technique which has to match the variety of combinations of the data which are needed to make a statement on overall system performance is outlined. It is shown how forward trial planning is drawing on experience gained so far. E.A.K.

N84-34411# Air Force Flight Test Center, Edwards AFB, Calif.
F-16 AND A-10 DIFFRACTION OPTICS HEAD UP DISPLAY (HUD) FLIGHT TEST EVALUATION c06
Hans-Georg F. Wurfel *In* AGARD Flight Test Tech. Jul. 1984 19 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The introduction of wide field of view (WFOV) diffraction optics head-up displays (HUDs) which provide potentially more capability than has been previously available is discussed. A direct head up, pilot to real world interface via video raster and stroke written symbology permits low level maneuvering flight at night and provides at least a survivable capability. Integration of the WFOV HUD with the F-16 and A-10 aircraft provides a useful ability to make single seat night attack a realistic and effective alternative. The major planning activities and test results of the F-16 and A-10 head-up displays (HUD) evaluations were examined. Relevant test procedures and test techniques applicable to HUD testing in general and night video raster testing in particular are reviewed. The unique test requirements and safety aspects of night attack system testing are addressed. E.A.K.

N84-34412# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
IN-FLIGHT ACCURACY AND COVERAGE TESTS OF ESM- AND ECM-SYSTEMS c32
Helmut Bothe and Kurt Klein *In* AGARD Flight Test Tech. Jul. 1984 9 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

Electronic Support Measurement Systems (EMS) and Systems for Electronic Counter Measures (ECM) of military aircraft require antennas for signal transmission and reception. The coverage of these antennas is an important parameter in the effectiveness of the systems. As the radiation patterns of aircraft antennas are interfered to a high degree by the structure and configuration of the aircraft, flight tests are conducted in order to prove the coverage of the above-mentioned systems. In addition, the accuracy of ESM systems, which measure the direction of arrival of an incoming radio frequency signal on board, is mostly influenced by the characteristics of the receiving antennas and hence has to be determined in flight too. A system was developed which covers the aforesaid requirements. It consists of 3 subsystems: a ground emitter system illuminating the target up to frequencies of 18 GHz; an on-board receiving system, which detects the signals received by the antennas of the system under test; and a data acquisition and transmission system, which transfers on-board and ground data to a digital computer for quick-look and data processing. Results of accuracy and coverage tests are given. R.J.F.

N84-34413# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Flugzeuge.
FLIGHT TEST TECHNIQUES USED FOR PROOF OF STRUCTURAL INTEGRITY OF TORNADO WHEN CARRYING EXTERNAL STORES c05
M. Pehl, F. J. Rudolph, E. Bertolina, and A. Ippolito *In* AGARD Flight Test Tech. Jul. 1984 25 p refs Prepared in cooperation with Aeritalia S.p.A., Torino, Italy (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The multirole characteristic of the MRCA (TORNADO) aircraft results in an almost universal capability to carry an array of existing

stores in every conceivable combination, within different operational flight envelopes. In order to verify the structural integrity of the aircraft when carrying stores, a comprehensive flight loads survey program was set up to validate the store aerodynamics used for the design of pylon attachments to the main structure, the pylons, and the store structure. A description of the overall stores flight test program including the instrumentation and calibration procedures, the flight test techniques and a presentation of the to date available data are given. Finally an explanation of the most significant problems occurred during this task are pointed out.
R.J.F.

N84-34414# Centre d'Essais en Vol, Istres (France). Service Methodes et Moyens d'Essais.
REAL TIME FLIGHT TEST CONDUCTION AND MONITORING [CONDUITE ET SURVEILLANCE DES ESSAIS EN VOL EN TEMPS REEL] c05
Bertrand Scherrer *In* AGARD Flight Test Tech. Jul. 1984 13 p In FRENCH (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The principle responsibility of the flight test center at Istres is to conduct tests of performance, structures, and propulsion. Located in a flat region with a favorable climate in the south of France, the center is ideal for conducting the more dangerous kinds of tests such as spin, extended flight domain, and tests of engine extinction and relighting. A special effort is devoted to means and equipment for increasing the benefits and safety of such tests, especially those which cannot be repeated without increasing potential risks. The measuring infrastructure used is described including telemetry, trajectory calculation, the computation center, and information presentation which permits the simultaneous management and supervision of more tests during their execution. Examples of these techniques are described including the CIGALE system and the cinetheodolites, and radar.
Transl. by A.R.H.

N84-34415# Avions Marcel Dassault-Breguet Aviation, Istres (France). Dept. Moyens de Mesure et Essais.
FLIGHT TESTING AND REAL TIME DATA PROCESSING FOR DEVELOPMENT AND INTEGRATION OF WEAPON SYSTEMS c05
Jean Costard *In* AGARD Flight Test Tech. Jul. 1984 12 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

Flight tests conducted on thirteen different families of aircraft by a total of 1259 personnel at the Istres, Bretigny, and Cazaux test centers are discussed. The advantages of using real time telemetry and data processing are examined. Signal reception and processing facilities used at each center for flight tests of the airframe, the effects of external loads, certification, weapons systems development, EMC-EMI compatibility, and reconnaissance capabilities are described.
Transl. by A.R.H.

N84-34416# Grumman Aerospace Corp., Calverton, N.Y.
REAL TIME TESTING: THE NEXT GENERATION c05
James D. Dinkel *In* AGARD Flight Test Tech. Jul. 1984 8 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

The development of a new display and control system for use with an automated telemetry system for on-line processing of flight test data is discussed. The requirements set for the new system and the design developed to meet them are discussed.
R.J.F.

N84-34417# Royal Aircraft Establishment, Bedford (England).
USING AN AIRBORNE CO2 CW LASER FOR FREE STREAM AIRSPEED AND WINDSHEAR MEASUREMENTS c36
Alan A. Woodfield and J. Michael Vaughan (Royal Signals and Radar Establishment, Malvern, England) *In* AGARD Flight Test Tech. Jul. 1984 18 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

Applications of a Laser True Airspeed System (LATAS) in flight are described with examples from trials with an exceptionally reliable and rugged system installed on the HS 125 research aircraft. The LATAS system is briefly described. Its remote sensing capability makes it particularly useful for measuring airflow conditions before they are disturbed by the aircraft. This is demonstrated with results from flight tests of LATAS as a self contained pressure error measurement system (when combined with total pressure and total temperature measurements), and also results from windshear measurements in a severe thunderstorm downburst (microburst). The possible extension of the system to measure turbulence by using a conical scanning beam is described, and several other possible uses such as an airspeed sensor that can discriminate instantaneously between small amplitude gusts and large disturbances for driving an intelligent autothrottle or a combined 3 axis air data and 3 axis ground velocity sensor for helicopters.
R.J.F.

N84-34418# Air Force Western Space and Missile Center, Vandenberg AFB, Calif.
NAVSTAR GPS APPLICATIONS TO TEST AND TRAINING c04
Kingston A. George and John B. McConnell *In* AGARD Flight Test Tech. Jul. 1984 7 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

A fifteen-month study on the uses of the NAVSTAR Global Positioning System (GPS) at the National Ranges operated by the United States Army, Navy, and Air Force for weapon system development, test, and training is summarized. It was conducted by a special triservice committee chartered by the Office of the Undersecretary of Defense for Research and Engineering. The primary objectives were to evaluate GPS application areas, identify and analyze technical issues, and recommend cost and mission effective applications. It was found that GPS technology will have a wide variety of use at the ranges with significant cost advantages and that the technical issues, some of which are quite challenging, do not pose serious obstacles to widespread employment. It will be necessary to design and develop a new family of GPS receiver hardware for range uses since the current generation of receivers does not satisfy the accuracy, data rate and continuity, and size demands of the typical range environment. The study provided the family definitions for GPS range equipment and the basis for a joint service development program under Air Force direction at Eglin AFB, Florida.
R.J.F.

N84-34419# Boeing Commercial Airplane Co., Seattle, Wash.
AN EXTENDED REAL-TIME MICROWAVE AIRPLANE POSITION SYSTEM c04
P. L. Pereboom, J. H. Lincoln, and R. N. Snow *In* AGARD Flight Test Tech. Jul. 1984 12 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

A real time Microwave Airplane Position System (MAPS) is currently being used by the Boeing Company for noise certification testing. The system measures ranges and range rates from several ground transponders to an airplane, and computes the airplane position using a Kalman Filter algorithm. Airplane position relative to a fixed Earth coordinate system is available for recording and cockpit display five times per second. Comparisons of position data from MAPS with data from Boeing phototheodolite systems have shown that MAPS accuracy is better than two meters when the airplane is within the design envelope of the ground transponder array. Unfortunately, the minimum practical altitude of a sign envelope is 50 meters, so MAPS cannot be used for takeoff and landing tests. To bridge the gap from the ground to 50 meters altitude, an alternate source of altitude information is required. The problems of obtaining absolute altitude information from other sources have been well documented. This report examines the inclusion of these alternate sources of altitude data in the Kalman Filter used by MAPS. Filter initialization was modified to include the calculation of bias errors found in the other sources derived from the original filter's estimate of airplane location. The measurement matrix was expanded to include the alternate sources in a manner that places emphasis on the most reliable sources of data with respect to the airplane's location.
B.W.

N84-34420# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
GENERAL INTEGRATED MULTIPURPOSE INFLIGHT CALIBRATION SYSTEM (GIMICS) c06
Ruediger Gandert and Ruediger Karmann *In* AGARD Flight Test Tech. Jul. 1984 17 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

In 1985 the new Advanced Technology Testing Aircraft System (ATTAS) will be operable at the DFVLR in Braunschweig. Owing to the wide application spectrum of ATTAS and the varied range of users, a flight test instrumentation system having a very high degree of flexibility and testability was required. It was therefore decided that a versatile built in test and calibration system called GIMICS should form an integral part of the ATTAS flight test instrumentation system. GIMICS is an intelligent, computer controlled system having dedicated access to the ATTAS subsystems. The system architecture and application flexibility of GIMICS will be presented. Author

N84-34421*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE DEVELOPMENT OF AN AIRBORNE INSTRUMENTATION COMPUTER SYSTEM FOR FLIGHT TEST c06
Glenn A. Bever *In* AGARD Flight Test Tech. Jul. 1984 13 p refs Previously announced as N84-20521 Prepared in cooperation with NASA. Dryden Flight Research Facility (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01 CSCL 01D

Instrumentation interfacing frequently requires the linking of intelligent systems together, as well as requiring the link itself to be intelligent. The airborne instrumentation computer system (AICS) was developed to address this requirement. Its small size, approximately 254 by 133 by 140 mm (10 by 51/4 by 51/2 in), standard bus, and modular board configuration give it the ability to solve instrumentation interfacing and computation problems without forcing a redesign of the entire unit. This system has been used on the F-15 aircraft digital electronic engine control (DEEC) and its follow on engine model derivative (EMD) project and in an OV-1C Mohawk aircraft stall speed warning system. The AICS is presently undergoing configuration for use on an F-104 pace aircraft and on the advanced fighter technology integration (AFTI) F-111 aircraft. Author

N84-34422# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
24 Sep. 1984 68 p Transl. into ENGLISH from various Russian articles
(JPRS-UTR-84-027) Avail: NTIS HC A04

Research and progress in Soviet transportation systems are reported. Topics discussed include: civil aviation, maritime and river fleets, and ports and transshipment centers. For individual titles, see N84-34423 through N84-34426.

N84-34423# Joint Publications Research Service, Arlington, Va.
ARSSR CIVIL AVIATION CHIEF ON AERFLOT'S WORK IN ARMENIA
In its USSR Rept.: Transp. (JPRS-UTR-84-027) 24 Sep. 1984 p 1-4 Transl. into ENGLISH from Grazhdanskaya Aviats. (Moscow), no. 7, Jul. 1984 p 15-16 (For primary document see N84-34422 24-01)
Avail: NTIS HC A04

Civil aviation in the Soviet Union was discussed. Development and construction of airports, the replacement of older model aircrafts for updated models on local air routes is outlined. Runway design and preparation for modern aircrafts and the development of local routes are examined. Progress in the different areas of civil aviation is reported. E.A.K.

N84-34424# Joint Publications Research Service, Arlington, Va.
MORE USE OF HELICOPTERS IN CONSTRUCTION WORK URGED
A. Chernitskiy *In its* USSR Rept.: Transp. (JPRS-UTR-84-027) 24 Sep. 1984 p 5-7 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 12 Jun. 1984 p 2 (For primary document see N84-34422 24-01)
Avail: NTIS HC A04

The high effectiveness of helicopter assembly work was described. It is indicated that with good organization and work preparation cost can be reduced, labor intensiveness and construction duration, and the ahead of schedule start up of projects provide an overall national economic effect which greatly surpasses the expenses of helicopter uses. E.A.K.

N84-34425# Joint Publications Research Service, Arlington, Va.
IMPROVEMENTS IN WORK OF AIRCRAFT REPAIR PLANT NO. 402
I. Volkov *In its* USSR Rept.: Transp. (JPRS-UTR-84-027) 24 Sep. 1984 p 8-10 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 12 Jun. 1984 p 2 (For primary document see N84-34422 24-01)
Avail: NTIS HC A04

Working conditions and accomplishments in an aircraft repair plant are discussed. Production effectiveness and work quality in the repair of engines for aircraft, cargo liners, and helicopters are outlined. Increasing labor productivity is emphasized. E.A.K.

N84-34426# Joint Publications Research Service, Arlington, Va.
ROLE OF AERODYNAMICS IN TUPOLEV, ILYUSHIN AIRCRAFT DESIGNS c02
G. Yudin *In its* USSR Rept.: Transp. (JPRS-UTR-84-027) 24 Sep. 1984 p 14-18 Transl. into ENGLISH from Grazhdanskaya Aviats. (Moscow), no. 6, Jun. 1984 p 34-35 (For primary document see N84-34422 24-01)
Avail: NTIS HC A04

The outlines of a new aircraft which originate in scientific search are examined. The design methods are based on the comprehensive solution of numerous designer problems, the majority of which are based on aerodynamics. The choice of an aerodynamic configuration of a new aircraft was based on theoretical and experimental studies to attain high aerodynamic efficiency and given lifting characteristics of the wing. These parameters will determine whether the aircraft is economical, easily controllable, and stable in various flying conditions, and will determine whether the aircraft designers' work will lead to the desired results. E.A.K.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N84-34427 Virginia Polytechnic Inst. and State Univ., Blacksburg.
EFFECT OF PHYSICAL PROPERTIES ON BREAK-UP AND ATOMIZATION OF LIQUID JETS IN A SUPERSONIC CROSSFLOW Ph.D. Thesis
Abdollah Shokoumi Nejad 1982 216 p
Avail: Univ. Microfilms Order No. DA8412939

The effects of injectant physical properties on the breakup and atomization of a transverse liquid jet in a supersonic airstream were studied. Viscosity and surface tension of the injectant were individually varied. The investigation employed photographic techniques. By using the diffractively scattered light method, the mean droplet diameter resulting from atomization at various transverse and axial locations in the spray plume was investigated. The results are: (1) jet penetration in the crossflow initially increases with increasing viscosity and then decreases; (2) jet penetration is essentially independent of surface tension; (3) for the cases of moderate viscosity and surface tension, wave growth and cross fracture of the jet column of the jet is the main mechanism of

breakup and atomization; (4) for high viscosity, ligament formation is the principal mechanism of atomization; (5) increasing viscosity reduces wave growth on the jet surface; (6) wave speed initially increases with increasing viscosity then decreases; and (7) wave speed and liquid clump velocities increase with decreasing surface tension. Dissert. Abstr.

N84-34428*# Compass Systems, Inc., San Diego, Calif.
WAKE PROFILE MEASUREMENTS OF FIXED AND OSCILLATING FLAPS
F. K. Owen Apr. 1984 38 p refs
(Contract NAS2-11080)
(NASA-CR-166602; NAS 1.26:166602) Avail: NTIS HC A03/MF A01 CSCL 01A

Although the potential of laser velocimetry for the non-intrusive measurement of complex shear flows has long been recognized, there have been few applications in other small, closely controlled laboratory situations. Measurements in large scale, high speed wind tunnels are still a complex task. To support a study of periodic flows produced by an oscillating edge flap in the Ames eleven foot wind tunnel, this study was done. The potential for laser velocimeter measurements in large scale production facilities are evaluated. The results with hot wire flow field measurements are compared. S.B.

N84-34429*# Compass Systems, Inc., San Diego, Calif.
LASER VELOCIMETER MEASUREMENTS OF DYNAMIC STALL
F. K. Owen Apr. 1984 25 p refs
(Contract NAS2-11080)
(NASA-CR-166603; NAS 1.26:166603) Avail: NTIS HC A02/MF A01 CSCL 01A

Laser velocimeter measurements were made during the study of a two-dimensional NACA 0012 airfoil undergoing conditions of dynamic stall. The measurements, which were obtained in the Ames 2 foot wind tunnel at reduced frequencies of 0.12 and 1.2, show significant flow field hysteresis around the static stall angle. Comparisons were also made with dual-plate interferograms and good agreement was found for the attached flow cases. For separated flow, characteristic vortex shedding caused poor agreement and significantly increased the measured Reynolds shear stresses. Author

N84-34430*# Aerometrics, Inc., Mountain View, Calif.
FLOW-FIELD MEASUREMENTS ON AN AIRFOIL WITH AN OSCILLATING TRAILING-EDGE USING HOLOGRAPHIC INTERFEROMETRY
W. D. Bachalo Jul. 1984 146 p refs
(Contract NAS2-11080)
(NASA-CR-166604; NAS 1.26:166604) Avail: NTIS HC A07/MF A01 CSCL 01A

Holographic interferometry data were acquired on an NACA 64A010 airfoil with an oscillating flap. The airfoil was installed in the Ames 11-Foot Transonic Wind Tunnel between splitter plates. Recordings were made at discrete phase angles of the oscillation. The interferometry results provided detailed flow visualization of the shock boundary-layer interaction and the separated flow. Quantitative results were extracted from the interferograms to produce pressure data. These results were compared to the surface pressures obtained with the surface pressure taps. Excellent agreement was found for low angles of incidence. At larger angles of incidence, the flow had greater three-dimensionality, and the results were not in good agreement in some regions of the flow field. Mach contours were traced for representative flow conditions. Wake profiles were also obtained using the assumption of constant pressure across the wake and the Crocco relationship. Author

N84-34431*# Integrated Systems, Inc., Palo Alto, Calif.
COMPARISON OF FREQUENCY-DOMAIN AND TIME-DOMAIN ROTORCRAFT VIBRATION CONTROL METHODS
N. K. Gupta Apr. 1984 149 p refs
(Contract NAS2-11271)
(NASA-CR-166570; NAS 1.26:166570) Avail: NTIS HC A07/MF A01 CSCL 01A

Active control of rotor-induced vibration in rotorcraft has received significant attention recently. Two classes of techniques have been proposed. The more developed approach works with harmonic analysis of measured time histories and is called the frequency-domain approach. The more recent approach computes the control input directly using the measured time history data and is called the time-domain approach. The report summarizes the results of a theoretical investigation to compare the two approaches. Five specific areas were addressed: (1) techniques to derive models needed for control design (system identification methods), (2) robustness with respect to errors, (3) transient response, (4) susceptibility to noise, and (5) implementation difficulties. The system identification methods are more difficult for the time-domain models. The time-domain approach is more robust (e.g., has higher gain and phase margins) than the frequency-domain approach. It might thus be possible to avoid doing real-time system identification in the time-domain approach by storing models at a number of flight conditions. The most significant error source is the variation in open-loop vibrations caused by pilot inputs, maneuvers or gusts. The implementation requirements are similar except that the time-domain approach can be much simpler to implement if real-time system identification were not necessary. B.W.

N84-34432*# National Aeronautics and Space Administration, Washington, D. C.
A NEW METHOD OF EVALUATING THE SIDE WALL INTERFERENCE EFFECT ON AIRFOIL ANGLE OF ATTACK BY SUCTION FROM THE SIDE WALLS
Hideo Sawada, Seizo Sakakibara, Manoru Sato, Hiroshi Kanda, and Toshio Karasawa Aug. 1984 39 p refs Transl. into ENGLISH of "Sokuhtkikarano Suikomi ni Yogu Tsubasa Gata Geikakueno Sokuh Ekikansho Kohkano Atarashi" rept. NAL-TR-680 National Aerospace Lab., Tokyo, Aug. 1981 p 1-18 Original language document was announced as N82-17123 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77722; NAS 1.15:77722; NAL-TR-680) Avail: NTIS HC A03/MF A01 CSCL 01A

A quantitative evaluation method of the suction effect from a suction plate on side walls is explained. It is found from wind tunnel tests that the wall interference is basically described by the summation form of wall interferences in the case of two dimensional flow and the interference of side walls. Author

N84-34402# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Flight Test Department.
A TECHNIQUE TO DETERMINE LIFT AND DRAG POLARS IN FLIGHT
A. Knaus *In* AGARD Flight Test Tech. Jul. 1984 14 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34426# Joint Publications Research Service, Arlington, Va.
ROLE OF AERODYNAMICS IN TUPOLEV, ILYUSHIN AIRCRAFT DESIGNS
G. Yudin *In its* USSR Rept.: Transp. (JPRS-UTR-84-027) 24 Sep. 1984 p 14-18 Transl. into ENGLISH from Grazhdanskaya Aviats. (Moscow), no. 6, Jun. 1984 p 34-35 (For primary document see N84-34422 24-01)
Avail: NTIS HC A04

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N84-34433 Department of the Air Force, Washington, D.C.
SELF-DEPLOYING AFTERBODY APPARATUS FOR AN EJECTION SEAT Patent

E. R. Schultz, inventor (to Air Force) Issued 31 Jul. 1984 6 p (AD-D011205; US-Patent-4,462,562; US-Patent-Appl-SN-418117; US-Patent-Class-244-122) Avail: US Patent and Trademark Office CSCL 01/3

A self-deploying afterbody apparatus for an ejection seat of an aircraft includes a cover plate, a plurality of arcuate-shaped stiffeners and a fabric skin of material. The cover plate is pivotally mounted at one end to the back side of the ejection seat and the stiffeners are pivotally mounted at their bases to the back side of the seat and share a common pivotal axis with the cover plate. The stiffeners are located between the cover plate and seat, and the fabric skin extends between the cover plate and seat and covers the stiffeners so as to form an expandible and collapsible bellows-like afterbody structure. In the collapsed position, the afterbody structure is folded up and locked against the back of the seat. When the seat ejects, a lanyard attached between the cover plate and aircraft floor pulls the afterbody structure into an expended, operative position. When the afterbody structure is fully extended, the continued ejection of the seat causes the lanyard to detach from the floor or cover plate. Author (GRA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N84-34434# Transportation Systems Center, Cambridge, Mass.
A SURVEY OF STATE-OF-THE-ART LORAN-C RECEIVERS Final Report, Sep. 1982 - Feb. 1984
F. D. MacKenzie and M. C. Poppe, Jr. Jun. 1984 109 p
(Contract DTRS57-83-C-0029)
(AD-A144199; DOT-TSC-CG-84-1; DOT-CG-N-1-84) Avail: NTIS HC A06/MF A01 CSCL 17/7

This report is a summary of the state-of-the-art in LORAN-C receiver design (April 1984). The data sources were manufacturers, designers, and trade literature. Every effort was made to accurately depict the status of receiver design activity in the midst of a volatile LORAN-C receiver market. New receiver models are being introduced monthly; existing models are being modified in response to requests from an expanding user community. Twenty-eight manufacturers have provided the author with data on eighty-five receivers. These receivers are the state-of-the-art technologies. Design features and current trends are included in this report as well as data sheets on each receiver. Author (GRA)

N84-34435# Federal Aviation Administration, Washington, D.C.
MODERNIZATION OF THE US NATIONAL AIRSPACE SYSTEM. FOUNDATION FOR THE FUTURE
May 1984 36 p
(AD-A144332) Avail: NTIS HC A03/MF A01 CSCL 17/7

The United States, with a large and complex aviation system, has embarked on a major program to provide safer, better and more efficient Federal services to the aircraft operators who use the U.S. National Airspace System. The effort also will reduce costs of operations and raise the productivity of the Federal Government. This booklet describes in brief and understandable form the nature of the modernization and the major elements of system improvement. GRA

N84-34406# Royal Aircraft Establishment, Farnborough (England).
REFERENCE SYSTEMS FOR THE EVALUATION OF DEAD-RECKONING NAVIGATION EQUIPMENT
R. F. Stokes and S. G. Smith *In* AGARD Flight Test Tech. Jul. 1984 17 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34418# Air Force Western Space and Missile Center, Vandenberg AFB, Calif.
NAVSTAR GPS APPLICATIONS TO TEST AND TRAINING
Kingston A. George and John B. McConnell *In* AGARD Flight Test Tech. Jul. 1984 7 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34419# Boeing Commercial Airplane Co., Seattle, Wash.
AN EXTENDED REAL-TIME MICROWAVE AIRPLANE POSITION SYSTEM
P. L. Pereboom, J. H. Lincoln, and R. N. Snow *In* AGARD Flight Test Tech. Jul. 1984 12 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N84-34436 Department of the Navy, Washington, D. C.
PIVOTAL MONO WING CRUISE MISSILE WITH WING DEPLOYMENT AND FASTENER MECHANISM Patent
F. D. Groutage, S. N. Conjerti, and L. S. Shaw, inventors (to Navy) Issued 12 Jun. 1984 9 p
(AD-D011192; US-Patent-4,453-426;
US-Patent-Appl-SN-372870-82; US-Patent-Class-74-2) Avail: US Patent and Trademark Office CSCL 16/4

A moveable wing aircraft including a quick release, attachment mechanism for carrying the aircraft on a bomb rack or other carrier and a mechanism for deploying the moveable wing from its captive carry position to its extended free flight position are disclosed. The aircraft includes an elongate fuselage, a portion of the top surface of which is substantially flat in order to accommodate the moveable wing. The moveable wing is positionable between a captive carry position in which it is aligned with the longitudinal axis of the fuselage and an extended free flight position. The single, moveable wing is pivoted around a central point from its captive carry position to its extended free flight position such that it is substantially perpendicular to the aircraft fuselage. The quick release mechanism extends through apertures in the wing in its captive carry position and is spring biased to retract through the wing and into the aircraft fuselage when released from the bomb rack or other carrier. The deployment mechanism includes a spring loaded cable and pulley arrangement. GRA

N84-34437# Aeronautical Research Labs., Melbourne (Australia).
IMPROVING THE FATIGUE LIFE OF THE MIRAGE IIIO WING MAIN SPAR
J. Y. Mann, A. S. Machin, and W. F. Lupson 1984 110 p refs (ARL-STRUC-Rept-398; AR-003-004) Avail: NTIS HC A06/MF A01

An increased life-of-type requirement for Mirage IIIO aircraft operated by the Royal Australian Air Force (RAAF) was associated with a specific need to develop a refurbishment technique for extending the lives of fatigue-cracked wing main spars. This led to a comprehensive series of flight-by-flight fatigue tests on specimens of a geometry and thickness (32 mm) closely representing the inboard lower rear flange section of the spar. Of the various options investigated, the most promising was the use of interference-fit steel bushes in bolt holes either alone or in combination with a modified anchor-nut sub-assembly which eliminated the need for some rivets in the spar flange. Specimens with oversize reamed holes utilizing oversized sleeved bolts performed poorly, while cold-expansion of the critical bolt hole using the Boeing split-sleeve process was unsatisfactory because of small hole-to-spar edge distances and the proximity of small rivet holes. This investigation has shown that acceptable extensions

in fatigue life for wing main spars of the Mirage IIIO are possibly by the use of combinations of standard bolts and 0.3% interference-fit steel bushes (of 1.5 mm wall thickness) in the critical bolt holes, with the provisos that pre-existing fatigue cracks are completely removed and that (after reworking) bolt hole/rivet hole separation distances are adequate. B.W.

N84-34438*# National Aeronautics and Space Administration, Washington, D. C.
GROB G-112: FLIGHT TESTING FULFILLS EXPECTATIONS
Sep. 1984 15 p Transl. into ENGLISH from Aerokurier (West Germany), v. 28, Jun. 1984 p 673-676 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77745; NAS 1.15:77745) Avail: NTIS HC A02/MF A01 CSCL 01C

The G-112 aircraft built for exhibition exhibited at the ILA '84. The G-2500 engine designed especially for this purpose is economical, requires little maintenance and generates a power of 66 kW (90 Hp). The aircraft achieves a cruising speed of 185 km/h, using a drastically reduced amount of fuel, (only 17 liters aviation fuel or premium gasoline). This small two-seater requires only a very short takeoff and taxi run of about 250 meters. Author

N84-34439*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GROUND VIBRATION TEST OF F-16 AIRPLANE WITH INITIAL DECOUPLER PYLON
F. W. Cazier, Jr. and M. W. Kehoe (NASA. Ames Research Center) Oct. 1984 47 p refs
(NASA-TM-86259; L-15782; NAS 1.15:86259) Avail: NTIS HC A03/MF A01 CSCL 01C

A ground vibration test was conducted on an F-16 airplane loaded on each wing with a 370-gal tank mounted on a standard pylon, a GBU-8 store mounted on a decoupler pylon, and an AIM-9J missile mounted on a wing-tip launcher. The decoupler pylon is a passive wing/store flutter-suppression device. The test was conducted prior to initial flight tests to determine the modal frequencies, mode shapes, and structural damping coefficients. The data presented include frequency response plots, force effect plots, and limited mode shape data. Author

N84-34440# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF THREE APPROACHES TO THE HELICOPTER PRELIMINARY DESIGN PROBLEM M.S. Thesis
A. C. Hansen Mar. 1984 117 p
(AD-A144315) Avail: NTIS HC A06/MF A01 CSCL 01/1

Three methodologies from which to approach the problem of preliminary helicopter design are explored in this paper. The first is a sensitivity analysis of the basic helicopter performance equations. The purpose here is to ascertain where reasonable simplifications can be made that do not seriously degrade the accuracy of the results. The second is a graphical parametric design method, known as Carpet Plots. In this method a graphical solution is developed to meet the design criteria of the helicopter. In the third, an overview of Boeing Vertol's Helicopter Sizing and Performance Computer Program is given. The computer routines which enable a person to access HESCOMP on the Naval Postgraduate School main frame IBM system are also provided.
Author (GRA)

N84-34441# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
APPLICATION OF COMPUTATIONAL FLUID DYNAMICS IN AIRCRAFT DESIGN
19 Jul. 1984 14 p Transl. into ENGLISH from Guoji Hanghong (China), no. 3(253), Mar. 1984 p 6-8
(AD-A144323; FTD-ID(RS)T-0741-84) Avail: NTIS HC A02/MF A01 CSCL 20/4

Three methods within computational fluid dynamics are discussed: the surface element method, the finite difference method, and the Navier-Stokes method. The advantages of computational fluid dynamics over wind tunnel tests are presented. The utilization of the three fluid dynamics methods in the design of fighter aircraft is described. R.S.F.

N84-34442# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ACTIVE SUPPRESSION OF AEROELASTIC INSTABILITIES ON A FORWARD SWEPT WING USING A LINEAR OPTIMAL REGULATOR M.S. Thesis
G. J. Pasquini 1 Jun. 1984 102 p
(AD-A144561; AFIT/GAE/AA/84J-01) Avail: NTIS HC A06/MF A01 CSCL 01/3

Recent advances in composite materials and active control principles have lead to renewed interest in the Forward Swept Wing (FSW) as a feasible aircraft design alternative. Sweeping a wing forward results in low static divergence speeds and additional aeroelastic instabilities which must be adequately controlled for an aircraft employing this wing design to have an acceptable flight envelope. This thesis seeks to demonstrate the utility of applying active feedback control principles to suppress aeroelastic instabilities associated with a FSW design. Analytical studies investigate the potential of applying optimal control theory techniques to synthesis of active flutter suppression control laws. For an example application, a FSW/fuselage model previously analyzed by Thomas Noll of AFFDL was used. Through use of Pade approximants to represent unsteady aerodynamic forces, the equations of motion are written in standard state space form. Linear optimal regulator theory is then applied to determine particular sets of gains which minimize a quadratic cost function in terms of the states and controls. Control laws are developed at a design flight condition which increases the onset of the lowest instability speed 20% above the wing bending/torsion instability speed. The optimal control law is then applied at off-design flight conditions to assess the robustness of the optimal regulator. Program listings are included. GRA

N84-34397# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF EXTERNAL STORE DRAG
K. Lutz and R. Matecki *In* AGARD Flight Test Tech. Jul. 1984 9 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34399# Air Force Flight Test Center, Edwards AFB, Calif.
HIGH ANGLE OF ATTACK TEST AND EVALUATION TECHNIQUES FOR THE 1980S
Gerald L. Jones *In* AGARD Flight Test Tech. Jul. 1984 13 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34400# National Aerospace Lab., Amsterdam (Netherlands).
DETERMINATION OF PERFORMANCE AND STABILITY CHARACTERISTICS FROM DYNAMIC MANOEUVRES WITH A TRANSPORT AIRCRAFT USING PARAMETER IDENTIFICATION TECHNIQUES
J. H. Breeman, L. J. J. Erkelens, and A. M. H. Nieuwpoort *In* AGARD Flight Test Tech. Jul. 1984 18 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34404# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Flight Test Department.
AIRCRAFT TESTS IN THE CLEARANCE PROGRAM FOR THE USE OF A COMBAT AIRCRAFT FROM A RUNWAY AFTER DAMAGE REPAIR
Wolfgang Seidel *In* AGARD Flight Test Tech. Jul. 1984 16 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34405# Aeroplane and Armament Experimental Establishment, Boscombe Down (England).
THE HANDLING AND PERFORMANCE TRIALS NEEDED TO CLEAR AN AIRCRAFT TO ACT AS A RECEIVER DURING AIR-TO-AIR REFUELLING
J. Bradley *In* AGARD Flight Test Tech. Jul. 1984 16 p (For

primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34410# Aeroplane and Armament Experimental Establishment, Boscombe Down (England).
FLIGHT TEST TECHNIQUES EMPLOYED IN THE NIMROD MR MK 2 WEAPON SYSTEM PERFORMANCE TRIALS
L. M. Dutton *In* AGARD Flight Test Tech. Jul. 1984 13 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34413# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Flugzeuge.
FLIGHT TEST TECHNIQUES USED FOR PROOF OF STRUCTURAL INTEGRITY OF TORNADO WHEN CARRYING EXTERNAL STORES
M. Pehl, F. J. Rudolph, E. Bertolina, and A. Ippolito *In* AGARD Flight Test Tech. Jul. 1984 25 p refs Prepared in cooperation with Aeritalia S.p.A., Torino, Italy (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34414# Centre d'Essais en Vol, Istres (France). Service Methodes et Moyens d'Essais.
REAL TIME FLIGHT TEST CONDUCTION AND MONITORING [CONDUITE ET SURVEILLANCE DES ESSAIS EN VOL EN TEMPS REEL]
Bertrand Scherrer *In* AGARD Flight Test Tech. Jul. 1984 13 p In FRENCH (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34415# Avions Marcel Dassault-Breguet Aviation, Istres (France). Dept. Moyens de Mesure et Essais.
FLIGHT TESTING AND REAL TIME DATA PROCESSING FOR DEVELOPMENT AND INTEGRATION OF WEAPON SYSTEMS
Jean Costard *In* AGARD Flight Test Tech. Jul. 1984 12 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34416# Grumman Aerospace Corp., Calverton, N.Y.
REAL-TIME TESTING: THE NEXT GENERATION
James D. Dinkel *In* AGARD Flight Test Tech. Jul. 1984 8 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N84-34443* National Aeronautics and Space Administration. Pasadena Office, Calif.
SYSTEM FOR INDICATING FUEL-EFFICIENT AIRCRAFT ALTITUDE Patent
Bruce L. Gary, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 2 Oct. 1984 8 p Filed 26 Aug. 1982 Supersedes N83-17536 (08 - 21, p 1135) Continuation-in-part of US-Patent-Appl-SN-224231, filed 12 Jan. 1981, US-Patent-4,346,595
(NASA-Case-NPO-15351-2; US-Patent-4,474,062; US-Patent-Appl-SN-412039; US-Patent-Class-73-178-R; US-Patent-Appl-SN-224231; US-Patent-4,346,595) Avail: US Patent and Trademark Office CSCL 01D

A method and apparatus are provided for indicating the altitude at which an aircraft should fly so the W/d ratio (weight of the aircraft divided by the density of air) more closely approaches the optimum W/d for the aircraft. A passive microwave radiometer on the aircraft is directed at different angles with respect to the horizon to determine the air temperature, and therefore the density of the air, at different altitudes. The weight of the aircraft is known. The altitude of the aircraft is changed to fly the aircraft at an altitude at which is W/d ratio more closely approaches the optimum W/d ratio for that aircraft.
Official Gazette of the U.S. Patent and Trademark Office

N84-34409# Naval Air Test Center, Patuxent River, Md. Systems Engineering Test Directorate.
SIMULATION APPLIED TO THE AVIONICS SYSTEM TESTING IN THE F/A-18
Andrew C. Cruce *In* AGARD Flight Test Tech. Jul. 1984 9 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34411# Air Force Flight Test Center, Edwards AFB, Calif.
F-16 AND A-10 DIFFRACTION OPTICS HEAD UP DISPLAY (HUD) FLIGHT TEST EVALUATION
Hans-Georg F. Wurfel *In* AGARD Flight Test Tech. Jul. 1984 19 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34420# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
GENERAL INTEGRATED MULTIPURPOSE INFLIGHT CALIBRATION SYSTEM (GIMICS)
Ruediger Gandert and Ruediger Karmann *In* AGARD Flight Test Tech. Jul. 1984 17 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34421*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE DEVELOPMENT OF AN AIRBORNE INSTRUMENTATION COMPUTER SYSTEM FOR FLIGHT TEST
Glenn A. Bever *In* AGARD Flight Test Tech. Jul. 1984 13 p refs Previously announced as N84-20521 Prepared in cooperation with NASA. Dryden Flight Research Facility (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01 CSCL 01D

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N84-34444*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IDENTIFICATION OF QUASI-STEADY COMPRESSOR CHARACTERISTICS FROM TRANSIENT DATA Final Report
K. B. Nunes and S. M. Rock Sep. 1984 290 p
(Contract NAS3-23537)
(NASA-CR-174685; NAS 1.26:174685) Avail: NTIS HC A13/MF A01 CSCL 20E

The principal goal was to demonstrate that nonlinear compressor map parameters, which govern an in-stall response, can be identified from test data using parameter identification techniques. The tasks included developing and then applying an identification procedure to data generated by NASA LeRC on a hybrid computer. Two levels of model detail were employed. First was a lumped compressor rig model; second was a simplified turbofan model. The main outputs are the tools and procedures generated to accomplish the identification. Author

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N84-34445*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IDENTIFICATION AND VERIFICATION OF FREQUENCY-DOMAIN MODELS FOR XV-15 TILT-ROTOR AIRCRAFT DYNAMICS
Mark B. Tischler, Joseph G. M. Leung, and Daniel C. Dugan Aug. 1984 20 p refs Prepared in cooperation with Army Research and Technology Lab., Moffett Field, Calif.
(NASA-TM-86009; A-9851; NAS 1.15:86009; TM-84-A-6) Avail: NTIS HC A02/MF A01 CSCL 01C

Frequency-domain methods are used to extract the open-loop dynamics of the XV-15 tilt-rotor aircraft from flight test data for the cruise condition (V = 170 knots). The frequency responses are numerically fitted with transfer-function forms to identify equivalent model characteristics. The associated handling quality parameters meet or exceed Level 2, Category A, requirements for fixed-wing military aircraft. Step response matching is used to verify the time-domain fidelity of the transfer-function models for the cruise and hover flight conditions. The transient responses of the model and aircraft are in close agreement in all cases, except for the normal acceleration response to elevator deflection in cruise. This discrepancy is probably due to the unmodeled rotor rpm dynamics. The utility of the frequency-domain approach for dynamics identification and analysis is clearly demonstrated.
Author

N84-34446# Dynamic Controls, Inc., Dayton, Ohio.
A DIGITAL LINEAR POSITION SENSOR FOR FLIGHT CONTROL ACTUATION Final Report, Jun. 1982 - Sep. 1983
G. D. Jenney and H. W. Schreadley Wright-Patterson AFB, Ohio AFWAL May 1984 64 p
(Contract F33615-82-C-3605)
(AD-A144283; AFWAL-TR-84-3043) Avail: NTIS HC A04/MF A01 CSCL 01/3

This report describes the digital position sensor using incremental encoding of a rod by using alternate washers of ferreous and nonferreous material. Sensors are mounted radially around the rod. The technique was successful. The report describes the theory, demonstration hardware and the test results. Author (GRA)

N84-34447# Naval Postgraduate School, Monterey, Calif.
COMPUTER PROGRAM TO SIMULATE THE LATERAL-DIRECTIONAL RESPONSE OF A HIGH PERFORMANCE AIRCRAFT DIGITAL ELECTRONIC FLIGHT CONTROL SYSTEM M.S. Thesis
S. F. Graves Mar. 1984 77 p
(AD-A144480) Avail: NTIS HC A05/MF A01 CSCL 01/3

The IBM Company's Continuous System Modeling Program was used to simulate the lateral and directional flight control systems of the F/A-18 aircraft. The model is designed for use in studies of high angle-of-attack maneuvering flight and is restricted to the Auto Flaps Up mode of operation. The model accepts simulated pilot stick and rudder inputs, air data information, and rate gyro, angle-of-attack, and acceleration feedback signals. Outputs are differential stabilator, differential leading-edge and trailing edge flap, aileron, and rudder deflections. Typical input values are used to validate the model, generating output controls surface deflections which correspond to those expected for the F/A-18 aircraft.
Author (GRA)

N84-34398# British Aerospace Aircraft Group, Preston (England).
THE FLIGHT TEST OF AN AUTOMATIC SPIN PREVENTION SYSTEM
P. S. Butcher and K. McKay *In* AGARD Flight Test Tech. Jul. 1984 11 p (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34401# Grumman Data Systems Corp., Calverton, N.Y.
APPLICATION OF ADVANCED PARAMETER IDENTIFICATION METHODS FOR FLIGHT FLUTTER DATA ANALYSIS WITH COMPARISONS TO CURRENT TECHNIQUES
Henry J. Perangelo and Paul R. Waisanen (Grumman Aerospace Corp., Calverton, N.Y.) *In* AGARD Flight Test Tech. Jul. 1984 29 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34403# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
FLIGHT TESTING A DIGITAL FLIGHT CONTROL SYSTEM: ISSUES AND RESULTS
Brian W. VanVliet *In* AGARD Flight Test Tech. Jul. 1984 10 p ref (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34407# Aeritalia S.p.A., Caselle Torinese (Italy). Combat Aircraft Group.
AUTOPILOT PERFORMANCE EVALUATION TORNADO EXPERIENCE AND FUTURE APPLICATIONS
R. Carabelli and R. Pelissero *In* AGARD Flight Test Tech. Jul. 1984 17 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N84-34448* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MODEL MOUNT SYSTEM FOR TESTING FLUTTER Patent
Moses G. Farmer, inventor (to NASA) Issued 9 Oct. 1984 9 p Filed 31 Mar. 1983 Supersedes N83-25727 (15 - 20, p 2351)
(NASA-Case-LAR-12950-1; US-Patent-4,475,385; US-Patent-Appl-SN-481106; US-Patent-Class-73-147) Avail: US Patent and Trademark Office CSCL 14B

A wind tunnel model mount system is disclosed for effectively and accurately determining the effects of attack and airstream velocity on a model airfoil or aircraft. The model mount system includes a rigid model attached to a splitter plate which is supported away from the wind tunnel wall several of flexible rods. Conventional instrumentation is employed to effect model rotation through a turntable and to record model flutter data as a function of the angle of attack versus dynamic pressure.
Official Gazette of the U.S. Patent and Trademark Office

N84-34449 Department of the Air Force, Washington, D.C.
AIRPLANE TAKE-OFF SYSTEM Patent
T. D. Earl, inventor (to Air Force) Issued 31 Jul. 1984 8 p
(AD-D011204; US-Patent-4,462,560; US-Patent-Appl-SN-341459; US-Patent-Class-244-63) Avail: US Patent and Trademark Office CSCL 01/2

This invention provides a system for launching aircraft into free flight regime regardless of runway conditions, wherein a sled of the self-powered air cushion vehicle type is configured in plan form so as to accept in temporarily locked relation thereupon and in combination there with an airplane in such manner that a successful take-off run in mutually aerodynamically compatible regime may be accomplished in spite of surface problems with the runway. Upon attainment of airborne speed, under control of the pilot the aircraft lifts off the sled into full free flight; and thus is airborne albeit the runway is at the time unusable by conventional wheelgeared aircraft; for example, as the result of a previous bombing attack on the runway by enemy aircraft. The sled incorporates self-propelling and directional guidance means

for retrieval/reuse purposes, as well as a take-off abort control system. Author (GRA)

N84-34450# Resource International, Inc., Columbus, Ohio.
MECHANISTIC METHODOLOGY FOR AIRPORT PAVEMENT DESIGN WITH ENGINEERING FABRICS. VOLUME 1: THEORETICAL AND EXPERIMENTAL BASE Final Report
Kamran Majidzadeh, George Ilves, Henry Sklyut, and V. R. Kumar Aug. 1984 173 p refs
(Contract DTFA01-81-C-10043)
(DOT/FAA/PM-84-9.1) Avail: NTIS HC A08/MF A01

A survey of available mechanistic models for reflection cracking as well as geotextile systems is reviewed. A first generation design program (EFRON), was developed based upon a two-dimensional finite element program to determine the stress patterns in the overlay. A three-dimensional computer program (RISC) is used to estimate existing pavement life. The fatigue cracking resistance of the fabric reinforced overlay system is evaluated by conducting laboratory beam fatigue testing on asphaltic overlays over concrete base. Three types of fabrics, as well as a control with no fabric, were used in the tests. Both thermal and loading fatigue cracking are simulated by applying external vertical and/or horizontal forces to produce joint movements equal to that of the full-scale pavements under field conditions. The results of the laboratory fatigue testing demonstrated the effectiveness of the engineering fabrics in retarding the formation of reflective cracking. Furthermore, the comparison of these results with EFRON program analysis indicated the full capability of EFRON to model the laboratory performance and hence its potential to predict the performance of overlays of actual runway. Author

N84-34451*# National Aeronautics and Space Administration, Washington, D. C.
CRYOGENIC WIND TUNNEL TECHNOLOGY. A WAY TO MEASUREMENT AT HIGHER REYNOLDS NUMBERS
Juergen W. Beck May 1984 34 p refs Transl. into ENGLISH from "Kryo-Windkanal-Technologie: Ein Weg zur Messung bei Hoeheren Reynolds-Zahlen" Munich, 1982 p 53-81, 83-87 Original language doc. was announced as A83-46484 Transl. by Scientific Translation Services, Santa Barbara, Calif. Original doc. prep. by Deutsche Forschungs- und Versuchanstalt fuer Luft-und Raumfahrt, Oberpfaffenhofen, West Germany
(Contract NASw-3542)
(NASA-TM-77481; NAS 1.15:77481) Avail: NTIS HC A03/MF A01 CSCL 14B

The goals, design, problems, and value of cryogenic transonic wind tunnels being developed in Europe are discussed. The disadvantages inherent in low-Reynolds-number (Re) wind tunnel simulations of aircraft flight at high Re are reviewed, and the cryogenic tunnel is shown to be the most practical method to achieve high Re. The design proposed for the European Transonic Wind tunnel (ETW) is presented: parameters include cross section. DISPLAY 83A46484/2 = 4 sq m, operating pressure = 5 bar, temperature = 110-120 K, maximum Re = 40 x 10 to the 6th, liquid N2 consumption = 40,000 metric tons/year, and power = 39,5 MW. The smaller Cologne subsonic tunnel being adapted to cryogenic use for preliminary studies is described. Problems of configuration, materials, and liquid N2 evaporation and handling and the research underway to solve them are outlined. The benefits to be gained by the construction of these costly installations are seen more in applied aerodynamics than in basic research in fluid physics. The need for parallel development of both high Re tunnels and computers capable of performing high-Re numerical analysis is stressed. R.J.F.

N84-34452# ICON, Inc., San Diego, Calif.
FLEET PROJECT TEAM PARTICIPATION IN MAJOR AVIATION TRAINING DEVICE DEVELOPMENT, ACQUISITION AND SUPPORT Final Report
J. P. Charles Jun. 1984 107 p
(Contract N61339-82-M-1131)
(AD-A144182; NAVTRAEQUIPC-82-M-1131-1) Avail: NTIS HC A06/MF A01 CSCL 05/1

A survey and analysis of the Fleet Project Team support requirements was conducted. A survey of typical team functions was completed. An analysis of the procedures involved in major aviation training device acquisition and support was conducted. Feasible solutions to Fleet Project Team problems in supporting trainer life cycle design, development, operation and modification/update were developed and recommendations made. Author (GRA)

N84-34453# Army Construction Engineering Research Lab., Champaign, Ill.
EVALUATION OF THE PAVEMENT CONDITION INDEX FOR USE ON POROUS FRICTION SURFACES Final Report
S. D. Kohn and M. Y. Shahin Jul. 1984 23 p
(AD-A144521; CERL-TR-M-351) Avail: NTIS HC A02/MF A01 CSCL 13/2

This report documents the results of a field study conducted to evaluate the use of the Pavement Condition Index (PCI) on porous friction surfaces (PFS). Pavements at seven landing field installations using PFS were studied. Results showed that the major problems on this type of surface were: (1) deterioration of underlying asphalt concrete material due to stripping of the asphalt binder; (2) delamination due to loss of bond between the PFS and underlying layer; and (3) raveling/weathering due primarily to jet blast. Based on the findings of this study, several modifications were recommended for incorporation into current procedures for evaluating and managing PFS pavements: (1) Modify severity-level definitions for longitudinal/transverse cracks and for raveling/weathering; (2) Rate low severity dense-graded patches as medium-severity; (3) Use a surface treatment of asphaltic material if permeability loss is more than half the original; (4) Develop a nondestructive test to locate areas of delamination; (5) Modify the PCI of older PFS pavements carefully to document when failures occur; and (6) Collect all available PCI and construction date information for PFS pavement and use it to develop a PCI Time Chart. GRA

N84-34454# Federal Aviation Administration, Washington, D.C. Office of Airport Planning and Programming.
INTRODUCTION TO THE AIRPORT IMPROVEMENT PROGRAM
Nov. 1983 17 p
(AD-A144556) Avail: NTIS HC A02/MF A01 CSCL 05/1

To promote the development of a system to meet the Nation's needs, the Federal Government embarked on a grants in aid program to units of state and local government shortly after the end of World War II. This early program, the Federal aid airport program (FAAP), was authorized by the Federal airport act of 1946 and drew its funding from the general fund of the treasury. In 1970, a more comprehensive program was established with the passage of the airport and airway development act of 1970. This act provided grants for airport planning under the planning grant program (PGP) and for airport development under the airport development aid program (ADAP). These programs were funded from a newly established airport and airway trust fund, into which were deposited revenues from several aviation user taxes on such items as airlines fares, air freight, and aviation fuel. The authority to issue grants under these two programs expired on September 30, 1981. During this 11 year period, 8,809 grants totalling $4.5 billion were approved for airport planning and development. The current grant program, known as the airport improvement program (AIP), was established by the airport and airway improvement act of 1982; it continues to provide funding for airport planning and development, but under a single program. Funding through the Airport and Airway Trust Fund is also continued, along with many other features in the previous legislation. The 1982 Act also authorizes funds for noise compatibility planning and to carry out noise compatibility programs as set forth in the Aviation Safety and Noise Abatement Act of 1979 (P.L. 96-193). GRA

N84-34455# Air Force Human Resources Lab., Brooks AFB, Tex.
COMPARISON OF COLOR VERSUS BLACK-AND-WHITE VISUAL DISPLAYS AS INDICATED BY BOMBING AND LANDING PERFORMANCE IN THE 2B35 TA-4J FLIGHT SIMULATOR Final

Report, Jun. 1980 - Mar. 1983
R. S. Kellogg, R. R. Woodruff, and R. S. Kennedy Jul. 1984 17 p
(AF Proj. 1123)
(AD-A144674; AFHRL-TR-84-22) Avail: NTIS HC A02/MF A01 CSCL 05/9

Twenty-two highly qualified and experienced Navy instructor pilots were tested with respect to: (1) bombing, and (2) landing performance in the General Electric 2B35 TA-4J full-color wide-screen flight simulator. Half the pilots flew with color first and then black-and-white, the other half flew in reverse order. In Phase I of the study, repeated bombing runs were made and circular bombing errors obtained. In Phase 2, repeated carrier-type landings were made and critical landing parameters were measured. Under the conditions of the study, no statistically significant differences were shown between performance with color or with black-and-white. Author (GRA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N84-34753# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
RENDEZVOUS AND DOCKING MISSION AND NAVIGATION SENSORS
A. Getzschmann *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 p 255-260 (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N84-34456# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A NATIONAL PROGRAM FOR DATA COLLECTION PLATFORMS: INFORMATION TECHNIQUES FOR USERS [O PROGRAMA NACIONAL DE PLATAFORMAS DE COLETA DE DADOS: INFORMACOES TECNICAS AOS USUARIOS]
Adauto Gouveia Motta, Fausto Carlos deAlmeida, Luiz Carlos Baldicero Molion, Marcio Nogueira Barbosa, and Pedro Rubens A. deCarvalho Jun. 1984 39 p
(INPE-3137-NTE/219) Avail: NTIS HC A03/MF A01

The concept of Data Collection Platforms (DCP), a description of available systems, and other information to potential users of the NPDCP - National Program of Data Collection Platforms are presented. Author

N84-34457*# Rockwell International Corp., Pittsburgh, Pa. Space Station Systems Div.
GROUND TEST ARTICLE FOR DEPLOYABLE SPACE STRUCTURE SYSTEMS Bimonthly Progress Report
G. D. Malloy Sep. 1984 21 p
(Contract NAS8-34657)
(NASA-CR-171158; NAS 1.26:171158; BMPR-3) Avail: NTIS HC A02/MF A01 CSCL 14B

The ground test article fabrication and assembly plan was completed by Santek Engineering, Inc. The plan was reviewed and accepted by Rockwell during an on-site visit to the Santek facility. Raw material and hardware orders were placed by Santek in July. Approximately 98% of the raw materials and 10% of the hardware deliveries have been completed. Several material and hardware substitutions were requested by Santek due to no-bid responses from suppliers or excessive costs for limited quantity items. These substitutions were evaluated and approved by Rockwell Engineering and Material and Process and are being incorporated into the drawing package. Santek started fabrication of detail parts in mid-August. Their current resource utilization is at approximately 50% of the planned eventual commitment and is increasing at a rate commensurate with the fabrication and assembly plan. At this writing, Santek's estimate of completion is 03%. During verification testing of the diagonal member joint, in a program funded by Rockwell discretionary funds, the axial load to unlock the joint was found to increase significantly after a few cycles of operation. This was attributed to galling, poor lubrication, and locking pin geometry. A change of materials, lubricant, and modification of the pin geometry reduced the unlocking load and provided repeatability after 50 cycles of operation. This new design is being implemented into the ground test article. Author

N84-34469*# Martin Marietta Aerospace, Denver, Colo.
DEVELOPMENT OF A THERMAL ENVIRONMENT SIMULATOR FOR LARGE TEST ARTICLES IN A VACUUM
Hal B. Storrs *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 1-7 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34472*# European Space Research and Technology Center, Noordwijk (Netherlands).
MAIN CHARACTERISTICS OF THE LARGE SPACE SIMULATION (LSS)
Peter W. Brinkmann *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 30-51 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34474*# Dayton Univ., Ohio.
THE SCEPTRE FACILITY: IMPROVED SIMULATION OF THE SPACE ENVIRONMENT THROUGH THE APPLICATION OF ADVANCED TECHNOLOGY
John D. Ruley *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 57-71 refs (For primary document see N84-34468 24-18)
(Contract F33615-82-C-5039)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34486*# European Space Agency, Noordwikj (Netherlands).
LEAK DETECTOR FOR SPACECRAFT TESTING WITH HIGH ACCURACY
G. Saenger and A. K. Franz *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 228-247 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34487*# Spar Aerospace Ltd., Ste-Anne-de-Bellevue (Quebec).
DESIGN OF AN ORBITAL HEATING SIMULATOR USING IR TECHNIQUES
M. Donato, G. Bush, A. Harris, and B. Muir (David Florida Lab., Ottawa, Ontario) *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 248-264 refs Sponsored in part by the Canadian Dept. of Communications (For primary

document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34488*# TRW Space Technology Labs., Redondo Beach, Calif.
TAPE HEATING METHOD FOR SPACE SIMULATION TESTING
H. W. Presley and R. P. Clifford *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 265-275 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34489*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE ROLE OF THE SHUTTLE ENGINEERING SIMULATOR IN THE SOLAR MAX RESCUE MISSION
Robert H. St.John and Bernd Strassner (Lockheed Engineering and Management Services Co., Inc.) *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 276-294 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34490*# Martin Marietta Aerospace, Denver, Colo.
MANNED MANEUVERING UNIT SIMULATIONS ON THE SPACE OPERATIONS SIMULATOR
Craig Hartley, Dave Cwynar, and Lex Ray *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 295-308 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34493*# Perkin-Elmer Corp., Danbury, Conn.
PREDICTIVE THERMAL-VACUUM MODELING BY VARIABLE COEFFICIENTS Abstract Only
John T. Chuvala *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 340 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34495*# McDonnell Aircraft Co., St. Louis, Mo.
PREPARATION AND CLEANLINESS VERIFICATIONS OF A SPACE SIMULATION CHAMBER FOR CONTAMINATION SENSITIVE TEST SPECIMENS
W. R. Koch and M. J. Moseley *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 343-352 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34496*# Boeing Aerospace Co., Seattle, Wash.
CONTAMINATION MEASUREMENTS DURING IUS THERMAL VACUUM TESTS IN A LARGE SPACE CHAMBER
C. R. Mullen and C. G. Shaw *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 353-371 (For primary document see N84-34468 24-18)
(Contract F04701-83-C-002)
Avail: NTIS HC A13/MF A01 CSCL 14B

N84-34498*# Lockheed Missiles and Space Co., Kennedy Space Center, Fla.
CONTAMINATION CONTROL AND CLEANLINESS LEVEL INTEGRITY FOR THE SPACE SHUTTLE ORBITER PLB, PAYLOADS AND FACILITIES AT KSC Abstract Only
D. Bartelson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 373-374 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N84-34458# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STOCHASTIC CONTROL OF PITCH MOTION OF SATELLITES USING STABILIZING FLAPS
Luiz Danilo Damasceno Ferreira, Atair Rios Neto, and Nellore Srinivasan Venkataraman Aug. 1984 31 p refs Submitted for publication
(INPE-3235-PRE/584) Avail: NTIS HC A03/MF A01

The modelling analysis and synthesis of an attitude control system for low orbit artificial satellites, using stabilizing flaps, are presented. The function of the system is to maintain the satellite aligned with the local vertical. The aerodynamic forces on the satellite are modelled assuming free molecular flow using the kinetic theory of gases. The control system development is considered through the application of stochastic control concepts. The satellite motion is described by the equations of motion based on Newtonian formulation. Starting from the separation principle, a sequential procedure is developed in which the state estimation and control problems are handled simultaneously. State estimate is provided by Kalman filter using the information about the position of the satellite and of the flaps. The controller acts on satellite in real time, and the stabilizing flaps are the only control elements.
Author

N84-34459*# General Dynamics Corp., St. Louis, Mo.
A STUDY OF SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS Final Briefing Report
5 Apr. 1983 136 p
(Contract NASw-3682)
(NASA-CR-173997; NAS 1.26:173997) Avail: NTIS HC A07/MF A01 CSCL 22B

The mission requirements, economic benefits, and time table of deployment of the space station are discussed. It is concluded that: (1) mission requirements overwhelmingly support the need for a space station; (2) a single space station is the way to begin; (3) the space station must evolve its capability; (4) the orbit transfer vehicle aspect of the space station will provide significant economic benefit; and (5) an early, affordable, effective way to start the space station program is needed. R.S.F.

N84-34460*# TRW, Inc., Cleveland, Ohio.
SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS. CONTRACTOR ORIENTATION BRIEFINGS Final Report
7 Apr. 1983 602 p Meeting held 14-15 Sep. 1982
(Contract NASw-3681)
(NASA-CR-173999; NAS 1.26:173999) Avail: NTIS HC A99/MF A01 CSCL 22B

Requirements are considered for user missions involving life sciences; astrophysics, environmental observation; Earth and planetary exploration; materials processing; Spacelab payloads; technology development; and communications are analyzed. Plans to exchange data with potential cooperating nations and ESA are reviewed. The capability of the space shuttle to support space station activities are discussed. The status of the OAST space station technology study, conceptual architectures for a space station, elements of the space-based infrastructure, and the use of the shuttle external tank are also considered. A.R.H.

N84-34461*# Teledyne Brown Engineering, Colorado Springs, Colo.
HISTORY OF ON-ORBIT SATELLITE FRAGMENTATIONS
N. L. Johnson, J. R. Gabbard, G. T. DeVere, and E. E. Johnson Aug. 1984 344 p
(NASA Order T-9388-J; Contract DASG60-84-C-0005)
(NASA-CR-171814; NAS 1.26:171814; CS84-BMDSC-0018) Avail: NTIS HC A15/MF A01 CSCL 22B

The causes of on-orbit fragmentations are varied and may be intentional or accidental. The cause of many fragmentations remains unknown. While a few cases are currently under investigation as on-orbit collision candidates, man is directly responsible for the vast majority of artificial debris polluting the near-Earth

space environment. It should be emphasized that the number of fragments listed with each event in this document represent only those debris officially cataloged by NORAD. Each known on-orbit satellite fragementation is described within this document in module format. Also listed are pertinent characteristics of each fragmentation event. Comments regarding the nature of the satellite and additional details of the events are given. B.W.

N84-34462*# National Aeronautics and Space Administration, Washington, D. C.
DYNAMIC ANALYSIS OF EVOLUTIVE CONSERVATIVE SYSTEMS. DISCUSSION OF EIGENMODE CROSSINGS
H. J.-P. Morand Sep. 1984 47 p refs Transl. into ENGLISH from Association Technique Maritime et Aeronautique Bull. (France), no. 76, 1976 p 329-350; 351, 352 and rept. ONERA-TP-1976-54 ONERA, France, 1976 p 1-22 Original language document was announced as A77-24953 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77052; NAS 1.15:77052; ONERA-TP-1976-54) Avail: NTIS HC A03/MF A01 CSCL 22B

After an analysis of the close connection between the symmetries of a dynamical system and the multiplicity of its vibrational natural frequencies, it is proved by variational arguments that for a system of invariable symmetry the eigenfrequencies associated with the eigenmodes of a given symmetry type do not cross, in general, during the evolution of this system. The theory is implemented by some numerical calculations applied to the analysis of the evolution of the axisymmetric hydroelastic modes of the Ariane launch vehicle during burning of the first stage. Author

N84-34463# Utah State Univ., Logan.
LWIR SIGNATURE FROM EXCEDE SPECTRAL Scientific Report, 1 Jan. - 30 Sep. 1983
F. Bien Hanscom AFB, Mass. AFGL 7 Mar. 1984 43 p Prepared in cooperation with Spectral Sciences, Inc.
(Contract F19628-83-C-0056)
(AD-A144169; SDL/84-013; SSI-TR-42; AFGL-TR-84-0095; SR-3) Avail: NTIS HC A03/MF A01 CSCL 20/6

EXCEDE/SPECTRAL was launched from Poker Flat Research Range, Alaska, on 19 October 1979. This report presents selected LWIR data obtained both during electron gun operation and non-operation. It presents a simplified outgassing model and discusses CO2(v2) emissions measured. Author (GRA)

N84-34471*# Ball Aerospace Systems Div., Boulder, Colo.
SPACE SIMULATION TESTING OF THE EARTH RADIATION BUDGET SATELLITE (ERBS)
Edward Magette and Derrin Smith *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 21-29 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

N84-34473*# Ball Aerospace Systems Div., Boulder, Colo.
SIMULTANEOUS THERMAL VACUUM TESTING OF GPS DRIVES FOR NAVSTAR
Thomas G. Brown *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 52-56 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

N84-34734# European Space Agency, Noordwikj (Netherlands). Satellite System Design.
ACCOMMODATION OF CANDIDATE LASER COMMUNICATION LINKS ON SELECTED SPACECRAFT CONFIGURATIONS
L. vanHoltz *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 p 123-129 refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34735# Teldix Luftfahrt-Ausruestungs G.m.b.H., Heidelberg (West Germany).
POINTING, ACQUISITION AND TRACKING FOR INTERSATELLITE OPTICAL DATA LINKS
W. Auer *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A07

N84-35224*# European Space Agency, Madrid (Spain). ESA Satellite Tracking Station.
THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE): SIX YEARS IN ORBIT
Juergen Faelker *In its* 4th European IUE Conf. Jul. 1984 p 465-468 refs Sponsored in part by NASA and British Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N84-34464* Rockwell International Corp., Huntsville, Ala. Space Transportation and Systems Group.
SPACE SHUTTLE AFRSI OMS POD ENVIRONMENT TEST USING MODEL 81-0 TEST FIXTURE IN THE AMES RESEARCH CENTER 9X7-FOOT SUPERSONIC WIND TUNNEL (OS-314A/B/C)
J. G. R. Collette Sep. 1984 83 p refs
(Contract NAS9-16283)
(NASA-CR-167689; NAS 1.26:167689; DMS-DR-2517) Avail: NTIS HC A05 CSCL 02A

A test was conducted in the NASA/Ames Research Center 9x7-foot Supersonic Wind Tunnel to help resolve an anomaly that developed during the STS-6 orbiter flight wherein sections of the Advanced Flexible Reusable Surface Insulation (AFRSI) covering the OMS pods suffered some damage. A one-third scale two-dimensional shell structure model of an OMS pod cross-section was employed to support the test articles. These consisted of 15 AFRSI blanket panels form-fitted over the shell structures for exposure to simulated flight conditions. Of six baseline blankets, two were treated with special surface coatings. Two other panels were configured with AFRSI sections removed from the OV099 orbiter vehicle after the STS-6 flight. Seven additional specimens incorporated alternative designs and repairs. Following a series of surface pressure calibration runs, the specimens were exposed to simulated ascent and entry dynamic pressure profiles. Entry conditions included the use of a vortex generator to evaluate the effect of shed vortices on the AFRSI located in the area of concern. Author

N84-34465*# Texas Univ., Dallas. Center for Space Sciences.
STUDY OF OUTGASSING AND DECOMPOSITION OF SPACE SHUTTLE HEAT PROTECTION TILES, FILLERS AND ADHESIVE Final Report
John H. Hoffman, Bertha L. Proctor, and John W. Blair 1984 5 p
(Grant NAG1-256)
(NASA-CR-173974; NAS 1.26:173974) Avail: NTIS HC A02/MF A01 CSCL 22B

A purge and trap technique which was employed to collect and separate the chemicals desorbing from the space shuttle heat protection tiles is described. The instrumentation included a mass spectrometer and gas chromatograph. R.S.F.

N84-34477*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE REACTION CONTROL SUBSYSTEM PROPELLANT TANK MASKED SCREEN TEST.
John B. Henderson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 101-110 (For primary

document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

N84-34478*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
GROUND TEST CHALLENGES IN THE DEVELOPMENT OF THE SPACE SHUTTLE ORBITER AUXILIARY POWER UNIT
Norman H. Chaffee, Renee J. Lance, and Dwayne P. Weary *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 111-132 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N84-34466# Atmospheric Radiation Consultants, Acton, Mass.
TELEMETRY BANDWIDTH SELECTION FOR INFRARED SURVEILLANCE SENSORS
A. S. Zachor, E. R. Huppi, and M. Ahmadjian Sep. 1983 47 p (Contract F19628-81-C-0140)
(AD-A144251; AFGL-TR-83-0319; SR-4) Avail: NTIS HC A03/MF A01 CSCL 17/5

Information theory, modelling and computer simulation are combined in this study to minimize the telemetry/recorder bandwidth requirements for IR sensors being developed by AFGL. The study included development and documentation of a computer code for optimizing the design of choppers, filters and electronics for IR radiometers. Author (GRA)

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N84-34467*# Old Dominion Univ., Norfolk, Va. Dept. of Electrical Engineering.
CONTROL METHODOLOGIES FOR LARGE SPACE STRUCTURES Final Report, period ending Sep. 1983
Griffith J. McRee and Edmond Altonji Aug. 1984 38 p (Grant NAG1-318)
(NASA-CR-173987; NAS 1.26:173987) Avail: NTIS HC A03/MF A01 CSCL 22B

The objectives of this research were to develop techniques of controlling a dc-motor driven flywheel which would apply torque to the structure to which it was mounted. The motor control system was to be implemented using a microprocessor based controller. The purpose of the torque applied by this system was to dampen oscillations of the structure to which it was mounted. Before the work was terminated due to the unavailability of equipment, a system was developed and partially tested which would provide tight control of the flywheel velocity when it received a velocity command in the form of a voltage. The procedure followed in this development was to first model the motor and flywheel system on an analog computer. Prior to the time the microprocessor development system was available, an analog control loop was replaced by the microprocessor and the system was partially tested. B.W.

N84-34468*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THIRTEENTH SPACE SIMULATION CONFERENCE. THE PAYLOAD: TESTING FOR SUCCESS
Joseph Stecher, ed. Washington 1984 283 p refs Conf. held in Orlando, Fla., 8-11 Oct. 1984 Sponsored in cooperation with Inst. of Environmental Sciences, AIAA, and the American Society for Testing and Materials
(NASA-CP-2340; NAS 1.55:2340) Avail: NTIS HC A13/MF A01 CSCL 22A

Information on the state of the art in space simulation, test technology, thermal simulation and protection, contamination, and test measurements and techniques are presented. Simulation of upper atmosphere oxygen was discussed. Problems and successes of retrieving and repairing orbiting spacecrafts by utilizing the shuttle are outlined. For individual titles, see N84-34469 through N84-34498.

N84-34469*# Martin Marietta Aerospace, Denver, Colo.
DEVELOPMENT OF A THERMAL ENVIRONMENT SIMULATOR FOR LARGE TEST ARTICLES IN A VACUUM c14
Hal B. Storrs *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 1-7 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

The simulation of the thermal environment by varying the effective sink temperature about the test article was examined. The accuracy of this simulation depends upon the spectral emissivity/absorptivity, the number and size of the control zones, the temperature of each zone, and the geometry of the enclosure. A very large number of zones closely conforming to the surface of the test article quickly become prohibitive due to expense and control problems. A two zone low price enclosure does not have the fidelity required for thermal balance testing. The development of a simulator which for a reasonable cost, simulates the thermal balance environment for most large test articles in the future is described. E.A.K.

N84-34470*# TRW Space Technology Labs., Redondo Beach, Calif.
INNOVATIVE METHOD FOR THE THERMAL CYCLING OF LARGE SPACECRAFT SYSTEMS
Carlos H. Steimer and Avery D. Hale *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 8-20 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

The use of low cost, off the shelf prefabricated enclosures for spacecraft system thermal cycling applications was indicated. The enclosures are erected in the satellite integration areas without disturbing the test article, electrical test set, or RF interfaces. They are assembled by metal clad, modular urethane panels. These panels are self supporting, and are locked and sealed to each other on assembly. Penetrations for interconnecting cables, coaxial and waveguide services; and temperature conditioning inlet and outlet ducts are easily incorporated where required. The facility and its advantages and intrinsic benefits are described. E.A.K.

N84-34471*# Ball Aerospace Systems Div., Boulder, Colo.
SPACE SIMULATION TESTING OF THE EARTH RADIATION BUDGET SATELLITE (ERBS) c15
Edward Magette and Derrin Smith *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 21-29 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

The Earth radiation budget components and dynamics and the interactions of this energy cycle, which influences our climate were investigated. The satellite package was subjected to space simulation testing. The size of the spacecraft dictated that the testing be conducted in the new BRUTUS Thermal Vacuum Facility. Computer aided control (CAC), quartz crystal microbalance (QCM), and residual gas analysis (RGA) monitoring are combined with rigid contamination control procedures to protect the flight

hardware from anomalous and potentially destructive out of scope test environments. E.A.K.

N84-34472*# European Space Research and Technology Center, Noordwijk (Netherlands).
MAIN CHARACTERISTICS OF THE LARGE SPACE SIMULATION (LSS) **c14**
Peter W. Brinkmann *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 30-51 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

The large space simulator at its European space research and technology center (ESTEC) was implemented. The facility enables mechanical and thermal tests on large satellites. The chamber will be equipped with a collimated solar beam of 6 meter diameter. Infrared equipment is available as alternative or complementary source of thermal radiation. Controlled variation of shroud temperatures can be utilized for thermal testing or temperature cycling of hardware. The basic concept and major design aspects of the facility are presented. E.A.K.

N84-34473*# Ball Aerospace Systems Div., Boulder, Colo.
SIMULTANEOUS THERMAL VACUUM TESTING OF GPS DRIVES FOR NAVSTAR **c15**
Thomas G. Brown *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 52-56 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

The solar array drive assemblies for the global positioning satellite (GPS) were built and the need to perform thermal vacuum acceptance testing on at least two complete units simultaneously is emphasized. The safety of the flight hardware is of primary importance. It is found that simultaneous space simulation testing of two complete drive packages requires only minor modification to the high vacuum pump stack. Attention is given to upgrading system safeties for high vacuum operation. Major modifications are designed and implemented for the thermal control system and supporting subsystems. The automated thermal control system and test bed hardware are of primary interest. E.A.K.

N84-34474*# Dayton Univ., Ohio.
THE SCEPTRE FACILITY: IMPROVED SIMULATION OF THE SPACE ENVIRONMENT THROUGH THE APPLICATION OF ADVANCED TECHNOLOGY **c14**
John D. Ruley *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 57-71 refs (For primary document see N84-34468 24-18)
(Contract F33615-82-C-5039)
Avail: NTIS HC A13/MF A01 CSCL 14B

SCEPTRE (Space Combined Effects Primary Test Research Equipment) is the Air Force Materials Laboratory's primary device for performance testing of spacecraft thermal control materials. It has been undergoing a major upgrade in the last two years aimed at making it capable of simulating the synergistic effects of vacuum, ultraviolet radiation, and electron radiation. In the course of this work, a number of advances have been made in the areas of computer data processing, solar simulation, and the analysis of test results. Author

N84-34475*# Martin Marietta Aerospace, Denver, Colo.
STANDARDIZATION IN SOFTWARE CONVERSION OF (ROM) ESTIMATING **c61**
Glen H. Roat *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 72-76 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 09B

Technical problems and their solutions comprise by far the majority of work involved in space simulation engineering. Fixed price contracts with schedule award fees are becoming more and more prevalent. Accurate estimation of these jobs is critical to maintain costs within limits and to predict realistic contract schedule dates. Computerized estimating may hold the answer to these new problems, though up to now computerized estimating has been complex, expensive, and geared to the business world, not to technical people. The objective of this effort was to provide a simple program on a desk top computer capable of providing a Rough Order of Magnitude (ROM) estimate in a short time. This program is not intended to provide a highly detailed breakdown of costs to a customer, but to provide a number which can be used as a rough estimate on short notice. With more debugging and fine tuning, a more detailed estimate can be made. B.W.

N84-34476*# Ford Aerospace and Communications Corp., Palo Alto, Calif. Western Development Lab. Div.
FATIGUE INDUCED CRACKING IN ALUMINUM LN-2 SHROUD OF 39 FOOT VACUUM CHAMBER **c26**
Arthur A. Edwards *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 77-100 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 11F

Fourteen years after completion of Ford's 39-foot space simulation chamber, leaks began to appear in its LN2 shroud. Although the shroud had been tight since its acceptance, cracks appeared in 1983 in some of the field welds of the one inch tubes which interconnect the LN2 panels. The resulting leaks were large enough to prevent pump down to high vacuum and could be heard easily when the chamber was at ambient conditions. New cracks appeared during each thermal cycle making it impossible to utilize the chamber for thermal vacuum testing. The analysis presented here implies that many, if not all, of the aluminum LN2 shrouds now in use may be in various stages of fatigue failure. The probability is high that fatigue cracks are working through the aluminum tubing in heat-affected zones of some field welds. The cracks may not be apparent yet, but after the shroud has experienced a certain number of thermal cycles these cracks will work through the material and become serious leaks. Fortunately, appropriate planning, analysis, and checking can, with a relatively small expenditure of money, help to avoid large and unexpected shroud failures and keep the chamber operational as long as it is needed. B.W.

N84-34477*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE REACTION CONTROL SUBSYSTEM PROPELLANT TANK MASKED SCREEN TEST **c16**
John B. Henderson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 101-110 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

During final development testing of the Space Shuttle Reaction Control Subsystem propellant tanks, a problem with pressure transients in the system was uncovered. Due to the nature of the tanks, performance tests to determine the impact of the transients on the expulsion efficiency of the tanks could not directly simulate the actual conditions which would be present in a low-gravity environment. However, by masking or covering various segments of the propellant acquisition device, a good simulation of a low-gravity environment was achieved in ground testing. Author

N84-34478*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
GROUND TEST CHALLENGES IN THE DEVELOPMENT OF THE SPACE SHUTTLE ORBITER AUXILIARY POWER UNIT **c16**
Norman H. Chaffee, Renee J. Lance, and Dwayne P. Weary *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 111-132 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

A conventional aircraft hydraulic system design approach was selected to provide fluid power for the Space Shuttle Orbiter. Developing the power unit, known as the Auxiliary Power Unit (APU), to drive the hydraulic pumps presented a major technological challenge. A small, high speed turbine drive unit powered by catalytically decomposed hydrazine and operating in the pulse mode was selected to meet the requirement. Because of limitations of vendor test facilities, significant portions of the development,

flight qualification, and postflight anomaly testing of the Orbiter APU were accomplished at the Johnson Space Center (JSC) test facilities. This paper discusses the unique requirements of attitude, gravity forces, pressure profiles, and thermal environments which had to be satisfied by the APU, and presents the unique test facility and simulation techniques employed to meet the ground test requirements. In particular, the development of the zero-g lubrication system, the development of necessary APU thermal control techniques, the accomplishment of integrated systems tests, and the postflight investigation of the APU lube oil cooler behavior are discussed. Author

N84-34479*# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
INTRODUCTION TO SIMULATION OF UPPER ATMOSPHERE OXYGEN SATELLITE EXPOSED TO ATOMIC OXYGEN IN LOW EARTH ORBIT c46
Daniel R. Peplinski, Graham S. Arnold, and Eugene N. Borson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 133-145 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 04A

A brief review of atmospheric composition in low Earth orbit is presented. The flux of ambient atomic oxygen incident on a surface orbiting in this environment is described. Estimates are presented of the fluence of atomic oxygen to which satellite surfaces in various orbits are exposed. Author

N84-34480*# Aerodyne Research, Inc., Billerica, Mass.
HYPERVELOCITY SUPERSONIC NOZZLE BEAM SOURCE OF ATOMIC OXYGEN c72
A. Freedman, W. Unkel (Massachusetts Inst. of Tech., Cambridge), J. Silver, and C. Kolb *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 146-149 refs Prepared in cooperation with Utah State Univ. (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 20H

A hypervelocity source of atomic oxygen was developed. Dissociation of molecular oxygen is accomplished by injection into a flow of helium and/or argon which has been heated in a commercial plasma torch. Atomic velocities of up to 4 kms(-1) were produced; recent improvements offer the possibility of even higher velocities. This source was utilized in studies of translational-to-vibrational energy transfer in carbon dioxide and in an investigation of the shuttle glow effect. Author

N84-34481*# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
A FACILITY FOR INVESTIGATING INTERACTIONS OF ENERGETIC ATOMIC OXYGEN WITH SOLIDS c72
Graham S. Arnold and Daniel R. Peplinski *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 150-168 refs Sponsored in part by the Aerospace Research Program (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 20H

A facility for the investigation of the interactions of energetic atomic oxygen with solids is described. The facility is comprised of a four-chambered, differentially pumped molecular beam apparatus which can be equipped with one of a variety of sources of atomic oxygen. The primary source is a dc arch-heated supersonic nozzle source which produces a flux of atomic oxygen in excess of 10 to the 15th power/cu cm/sec at the target, at a velocity of 3.5 km/sec. Results of applications of this facility to the study of the reactions of atomic oxygen with carbon and polyimide films are briefly reviewed and compared to data obtained on various flights of the space shuttle. Author

N84-34482*# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
AN ATOMIC OXYGEN FACILITY FOR STUDYING POLYMER MATERIALS FOR SPACECRAFT APPLICATIONS c27
R. C. Tennyson, J. B. French, L. J. Kok, J. Kleiman, and D. G. Zimcik (Communications Research Centre, Canada) *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 169-192 refs Sponsored in part by the Communications Research Centre (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 11B

A nozzle beam facility utilizing microwave discharge on a helium carrier gas seeded with oxygen to produce atomic oxygen fluxes of the order of 10 to the 15th power atoms/cu cm/sec is described. In addition, limited test results obtained from exposing a graphite/epoxy composite and Kapton (H) film are presented in terms of mass loss measurements and changes in surface morphology. Author

N84-34483*# Los Alamos Scientific Lab., N. Mex.
A LOW EARTH ORBIT MOLECULAR BEAM SPACE SIMULATION FACILITY c46
Jon B. Cross *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 193-204 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 04A

A brief synopsis of the low Earth orbit (LEO) satellite environment is presented including neutral and ionic species. Two ground based atomic and molecular beam instruments are described which are capable of simulating the interaction of spacecraft surfaces with the LEO environment and detecting the results of these interactions. The first detects mass spectrometrically low level fluxes of reactively and nonreactively surface scattered species as a function of scattering angle and velocity while the second ultrahigh velocity (UHV) molecular beam, laser induced fluorescence apparatus is capable of measuring chemiluminescence produced by either gas phase or gas-surface interactions. A number of proposed experiments are described. Author

N84-34484*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE ENERGY DEPENDENCE AND SURFACE MORPHOLOGY OF KAPTON (TRADEMARK) DEGRADATION UNDER ATOMIC OXYGEN BOMBARDMENT c72
Dale C. Ferguson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 205-221 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 20H

Data from laboratory simulations and from samples returned from STS-8 are used to derive the energy dependence of the mass loss rate of Kapton under atomic oxygen bombardment and to discuss the development of surface structure and its effect on erosion rates. It is concluded that all the laboratory data from discharge and flow tubes and from accelerated beams, along with the orbital data from STS-3 through STS-8, can be accommodated by a rate of mass loss that varies with impact energy normal to the surface. It is hypothesized that increases of mass loss rate with exposure time may be due to trapping of the incoming atoms by the surface structure which develops. Author

N84-34485*# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
ATOMIC BEAM SYSTEM FOR LABORATORY SIMULATION OF UPPER ATMOSPHERE OXYGEN ATOM IMPACT ON STS SURFACES c72
P. Mahadevan *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 222-227 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 20H

An atomic beam apparatus capable of producing a collimated beam of O atoms or other atmospheric species at the STS impact velocity of 8 km/s is described. A conventional ion beam charge transfer neutralization approach was adopted to produce the projectile beam. The prime considerations favoring this approach are: the ability to vary the velocity of the impacting species at will over a wide range on either side of the optimum required value of 8 km/s; and sample irradiation can be made with species other than O-atoms, such as O2, N, or N2. M.G.

N84-34486*# European Space Agency, Noordwikj (Netherlands).
LEAK DETECTOR FOR SPACECRAFT TESTING WITH HIGH ACCURACY **c14**
G. Saenger and A. K. Franz *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 228-247 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

It is convenient to measure the leak rate of spacecraft when the spacecraft is kept in its container and the increment of tracer gas, mostly noble gases, in the container air is measured as function of time. In order to meet the specification of the new voluminous spacecraft, a leak detector with high accuracy is required. This is made difficult, because of the natural abundance of noble gases in air, which mean a considerable background exists. A leak detector is described which allows the measurement of an increment of the concentration of a few % using reference gas. Author

N84-34487*# Spar Aerospace Ltd., Ste-Anne-de-Bellevue (Quebec).
DESIGN OF AN ORBITAL HEATING SIMULATOR USING IR TECHNIQUES **c14**
M. Donato, G. Bush, A. Harris, and B. Muir (David Florida Lab., Ottawa, Ontario) *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 248-264 refs Sponsored in part by the Canadian Dept. of Communications (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

The design of an IR rig to supply and monitor radiation fluxes in order to verify a thermal math model is discussed. The design incorporates IR lamps, Calrods and baffles to best suit the requirements of the specific zones. The required fluxes are calculated from the IR lamp/Calrod configuration software which can account for the effect of specular baffles and surface absorptivities. Radiation intensities are measured using the absorbed flux technique. Sensors, with surface properties matched to the appropriate spacecraft zone, are calibrated under conditions identical to test. The rig itself is capable of reproducing all test conditions and is versatile enough to handle other spacecrafts. Author

N84-34488*# TRW Space Technology Labs., Redondo Beach, Calif.
TAPE HEATING METHOD FOR SPACE SIMULATION TESTING **c14**
H. W. Presley and R. P. Clifford *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 265-275 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

An ohmic heating technique for simulating the solar heat input to a spacecraft during space environment testing was developed. Tests of spacecraft radiator sample panels were used to evaluate the heating method for its potential hazard to sensitive surfaces and for its application accuracy prior to use in full scale thermal vacuum tests of flight spacecraft and thermal models. Author

N84-34489*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE ROLE OF THE SHUTTLE ENGINEERING SIMULATOR IN THE SOLAR MAX RESCUE MISSION **c14**
Robert H. St.John and Bernd Strassner (Lockheed Engineering and Management Services Co., Inc.) *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 276-294 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

Background information concerning the makeup of the SES, the role it traditionally plays in support of the Shuttle Program, its capabilities and the specific work performed on the simulator during the sixteen months proceedings the Solar Max repair mission is presented. The SES plays a significant role in the preparations for the STS 41-C Solar Max repair mission and during the mission in the development of the plan and procedures to retrieve the satellite after the MMU docking attempts failed. The development of the on orbit simulation capabilities required to support this mission is to a very large extent simply an expansion of the capabilities designed into the SES to support previous engineering simulation requirements for the Space Shuttle program. Author

N84-34490*# Martin Marietta Aerospace, Denver, Colo.
MANNED MANEUVERING UNIT SIMULATIONS ON THE SPACE OPERATIONS SIMULATOR **c14**
Craig Hartley, Dave Cwynar, and Lex Ray *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 295-308 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

Details of the Manned Maneuvering Unit (MMU) and its use is discussed. MMU simulations in the Space Operations Simulator (SOS) use two major devices. The first is a six-degree-of-freedom moving base carriage that allows the trainee freedom to fly the MMU in a large room and to match rates and dock with full scale targets. The second device is a large screen television display that provides the trainee with accurate views of tumbling targets from any point in a surrounding sphere up to 300 meters (1000 feet) in diameter. Astronauts used the SOS to train for the Solar Max repair mission and are now using it to train for a mission to recover the Palapa-B communications satellite. Subjective comparisons by astronauts of an orbit MMU performance to simulated MMU performance in the SOS indicate that the simulations are very realistic. Data from the Solar Max mission have resulted in two software upgrades that increase SOS fidelity for the next MMU mission: a model of contact dynamics between the MMU and a target spacecraft, and a model of MMU plume impingement forces during docking. Author

N84-34491*# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
DISTORTION MEASUREMENT OF ANTENNAS UNDER SPACE SIMULATION CONDITIONS WITH HIGH ACCURACY AND HIGH RESOLUTION BY MEANS OF HOLOGRAPHY **c35**
Holm U. Frey *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 309-319 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14E

The use of laser holography for measuring the distortion of antennas under space simulation conditions is described. The subject is the so-called double exposure procedure which allows to measure the distortion in the order of 1 to 30/micrometers + or - 0.5 per hologramme of an area of 4 m diameter max. The method of holography takes into account the constraints of the space simulation facility. The test method, the test set up and the constraints by the space simulation facility are described. The results of the performed tests are presented and compared with the theoretical predictions. The test on the K-Band Antenna e.g., showed a distortion of approximately 140/micrometers + or - 5/micrometers measured during the cool down from -10 C to -120 C. Author

N84-34492*# Barry Wright Corp., Burbank, Calif.
VIBRATION ISOLATION SYSTEM FOR TESTING IN A VACUUM **c39**
Jack Dankowski *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 320-339 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 20K

The design, manufacture, and testing of an isolation system placed under a bench which simulates a space platform during testing in a hard vacuum are described. A low natural frequency isolation system is used to decouple ground vibrations from the bench. The materials used are vacuum compatible and do not introduce unwanted matter which would contaminate the payload optics and/or the testing environment. The system accommodates payloads of varying weights and envelopes. Author

N84-34493*# Perkin-Elmer Corp., Danbury, Conn.
PREDICTIVE THERMAL-VACUUM MODELING BY VARIABLE COEFFICIENTS Abstract Only **c14**

John T. Chuvala *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 340 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

In computer-assisted thermal-vacuum testing, an accurate mathematical thermal model is necessary. This model can indicate what effect a given change in control temperature will produce on the test article. A three-node thermal model is used to illustrate some numerical methods for increasing the accuracy by generating more accurate coefficients for the model. Author

N84-34494*# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
IMPROVED MATERIALS CHARACTERIZATION FOR SPACECRAFT APPLICATIONS Abstract Only
R. Cull *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 341 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 22B

A material outgassing test consists of an effusion cell, mass spectrometer, and thermally controlled quartz crystal microbalance (TQCM). The material sample is placed in the effusion cell at a predetermined temperature, and the sample is outgassed in a vacuum of 0.000001 torr range. The total outgassing mass as a function of time is determined with the TQCM which is cooled to LN2 temperatures. Based on the view factor of the TQCM, the total outgassed mass can be determined. The technique can be verified by comparing the results to the actual mass loss of the sample which is determined by hanging the diffusion cell from the Cohn microbalance. The mass spectrometer can be used to determine if there are any low molecular weight components outgassing, such a nitrogen which does not condense on the TQCM. After the material outgasses to a point of saturation, the effusion cell is closed off, and the TQCM is slowly heated to allow the condensed film to be broken down into its components. As the temperature is increased, the components evaporate from the surface at a different rate and can be detected with the mass spectrometer. The relative amount of each component is found by the change in frequency of the TQCM as the component evaporates. Hence, from this test, not only is isothermal kinetic data obtained, but the primary components can also be identified in terms of their molecular weight. Author

N84-34495*# McDonnell Aircraft Co., St. Louis, Mo.
PREPARATION AND CLEANLINESS VERIFICATIONS OF A SPACE SIMULATION CHAMBER FOR CONTAMINATION SENSITIVE TEST SPECIMENS c14
W. R. Koch and M. J. Moseley *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 343-352 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

Contamination sensitive optical devices were to be evaluated under thermal vacuum conditions. Test specifications called for an extremely clean chamber environment, ambient temperature chamber walls, and optical surface temperatures at approximately - 30 C. Chamber preparation included the replacement of diffusion pumps with cryopumps and the cleaning of the chamber walls to reduce contamination levels. Chamber cleaning using vacuum bake was tried and abandoned as time consuming and ineffective. Chemical cleaning and cleanliness verification methods were developed. Gas chromatograph analysis techniques were used extensively throughout the cleaning process to verify cleanliness levels prior to evacuating the chamber. A chamber cleanliness verification test using a thermoelectric quartz crystal microbalance and witness samples was performed to demonstrate that an appropriate cleanliness level was achieved. Author

N84-34496*# Boeing Aerospace Co., Seattle, Wash.
CONTAMINATION MEASUREMENTS DURING IUS THERMAL VACUUM TESTS IN A LARGE SPACE CHAMBER c14
C. R. Mullen and C. G. Shaw *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 353-371 (For primary document see N84-34468 24-18)
(Contract F04701-83-C-002)
Avail: NTIS HC A13/MF A01 CSCL 14B

The levels of contamination that originate from inside the IUS equipment support section (ESS) due to outgassing from electronics components and wiring operating at elevated temperatures (80-160 F) were investigated. Pressure was measured inside and outside the ESS. Mass deposition measurements were made with quartz crystal microbalances (QCM) facing into and away from ESS vents. The QCM's were operated at -50 C and -180 C using thermoelectrically and cryogenically cooled QCM's. Gaseous nitrogen flow inside the ESS was used to obtain the effective molecular flow vent area of the ESS, which was evaluated to be 359 sq cm (56 sq in) compared to the 978 sq cm (150 sq in) estimated by an earlier atmosphere pressure billowing test. The total outgassing rate of the ESS materials at a temperature of 60 C (140 F) decays with a time constant of 11.5 hours based on pressure measurements during the hot cycle. A time constant of 22 hours was estimated for the fraction of the outgassing which will condense on a -50 C surface. In contrast, the time constant is only 10.1 hours for the outgassing material which condenses on a surface at -180 C. A surface at -180 C collects approximately one half of the material vented from the ESS which impinges on it. Pressure measurements show very good correlation with the mass deposition measurements. A.R.H.

N84-34497*# Perkin-Elmer Corp., Danbury, Conn.
HUBBLE SPACE TELESCOPE COMPONENT QUALIFICATION UTILIZING A RESIDUAL GAS ANALYZER Abstract Only c89
Alvin H. Westfall *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 372 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 03A

An approach is described for integrating an automated residual gas analyzer (RGA) into the thermal vacuum outgas process. The RGA has the capability of detailed analysis over a 200 amu range with monitoring of each peak as the test progresses. The NASA criterion of either a 50% reduction of each peak over 44 amu or less than an 0.1% amplitude of the 28 amu base peak for all amu's above 44 amu is satisfied. A computer sorts, reports which peaks do not satisfy the criterion, and reports test completion. The computer plots amplitudes of all the peaks from 1 amu through 200 amu for each scan. This RGA real time approach is unique in that it provides sufficient detail to highlight a problem as it occurs. By comparison, a quartz crystal microbalance (QCM) or a thermoelectric quartz crystal microbalance (TQCM) indicates to the operator when changes occur, but not what has happened. Optical witness samples indicate whether a test was satisfactory within a few days after the test was completed. A.R.H.

N84-34498*# Lockheed Missiles and Space Co., Kennedy Space Center, Fla.
CONTAMINATION CONTROL AND CLEANLINESS LEVEL INTEGRITY FOR THE SPACE SHUTTLE ORBITER PLB, PAYLOADS AND FACILITIES AT KSC Abstract Only c14
D. Bartelson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 373-374 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14B

The PLB, its cargo, and payload canister must satisfy the cleanliness requirements of visual clean (VC) level 1, 2, 3, or special as stated in NASA document SN-C-0005A. The specific level of cleanliness is chosen by the payload bay customer for their mission. During orbiter turnaround processing at KSC, the payload bay is exposed to the environments of the Orbiter Processing Facility (OPF) and the Payload Changeout Room (PCR). In supportive response to the orbiter payload bay/facility interface, it is necessary that the facility environment be controlled and monitored to protect the cleanliness/environmental integrity of the payload bay and its cargo. Techniques used to meet environmental requirements during orbiter processing are introduced. A.R.H.

N84-34499# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

OPTIMAL SENSOR/ACTUATOR PLACEMENT ON A LARGE SPACE STRUCTURE M.S. Thesis
R. R. Luter Mar. 1984 92 p
(AD-A144560; AFIT/GA/AA/82D-6) Avail: NTIS HC A05/MF A01 CSCL 22/1

The method of eliminating observation and control spillover is studied by making groups of reduced order controlled modes orthogonal to each other. These modes are the rows and columns of the system matrices which are calculated from the direction cosine matrix and the eigenvector matrix. The direction cosine matrix is determined from the locations and orientations of the sensor/actuators. The eigenvector matrix is determined from the NASTRAN finite element model of large space structure. The decentralized controller can be made stable if the placement of the sensors/actuators cause the spillover to be eliminated. The program ANGLE is developed to calculate the angles between modes. After selecting a possible grouping of modes, problem angles are identified for improvement. These angles are then improved using the ORIENT program by manipulating the sensor/actuator placement model. Finally, the finite element model is changed to see its effect on the angles between the modes.
Author (GRA)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N84-34500# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A FAULT-TOLERANT MULTIPROCESSING UNIT FOR ON-BOARD SATELLITE SUPERVISION AND CONTROL
Alderico R. dePaula, Jr. and Ricardo C. O. Martins Aug. 1984 8 p ref Presented at the 5th Congr. Brasileiro de Automatica, and at the 1st Congr. Latino-Am. de Automatica, Campina Grande, Brazil, 3-6 Sep. 1984
(INPE-3244-PRE/590) Avail: NTIS HC A02/MF A01

This work presents a standard for fault-tolerant 16-bit multiprocessing systems to be utilized on board of satellites for their supervision and control. The systems, defined by the proposed standard, are characterized by their modularity, easy adaptation to different satellites and tolerances to single-point failures. The methodology for the development of such a standard is also outlined. This is based on the organization of the fault detection, analysis/confinement and recovery techniques according to the logical hierarchical layers of the system. The proposed multiprocessing system is constituted by a set of 16-bit multiprocessing units interconnected by redundant busses. The techniques for fault-tolerance in a typical multiprocessing unit are presented stressing their structural interrelationship according to the following system layers: hardware, operating system and applicative processes.
Author

N84-34501*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FABRICATION OF GLASS GAS CELLS FOR THE HALOE AND MAPS SATELLITE EXPERIMENTS
Edward M. Sullivan and Harry G. Walthall Oct. 1984 38 p refs
(NASA-TM-86302; NAS 1.15:86302) Avail: NTIS HC A03/MF A01 CSCL 14B

The Halogen Occultation Experiment (HALOE) and the Measurement of Air Pollution from Satellites (MAPS) experiment are satellite-borne experiments which measure trace constituents in the Earth's atmosphere. The instruments which obtain the data for these experiments are based on the gas filter correlation radiometer measurement technique. In this technique, small samples of the gases of interest are encapsulated in glass cylinders, called gas cells, which act as very selective optical filters. This report describes the techniques employed in the fabrication of the gas cells for the HALOE and MAPS instruments. Details of the method used to fuse the sapphire windows (required for IR transmission) to the glass cell bodies are presented along with detailed descriptions of the jigs and fixtures used during the assembly process. The techniques and equipment used for window inspection and for pairing the HALOE windows are discussed. Cell body materials and the steps involved in preparing the cell bodies for the glass-to-sapphire fusion process are given. Author

N84-34752# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
CONTINUOUS WAVE (CW) DIODE LASER INSTRUMENTATION FOR RENDEZVOUS AND DOCKING MANEUVERS IN GEO-SYNCHRONOUS ORBITS
G. Sepp *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N84-34502*# National Aeronautics and Space Administration, Washington, D. C.
PHENOMENOLOGY OF PLASMA ENGINE CATHODES AT HIGH CURRENT RATES AND LOW PRESSURES
H. Huegel and G. Kruelle Aug. 1984 11 p Transl. into ENGLISH from "Phaenomenologie von Plasmatriebwerkskathoden bei Hohen Stromen und Niedrigen Drucken" Rept. No. DLR-MITT-67-17, Oct. 1967 p 158-165 Original language document was announced as N68-13936 Transl. by Scientific Translation Services, Santa Barbara, Calif. Original doc. prep. by Wissenschaftliche Gesellschaft fuer Luft- und Raumfahrt
(Contract NASw-3542)
(NASA-TM-77729; NAS 1.15:77729; DLR-MITT-67-17) Avail: NTIS HC A02/MF A01 CSCL 21C

The effects of low surrounding pressures on cathodes of arc jet engines with electromagnetic acceleration are investigated for pressure and current energies of 20 to 100 Torr. and 400 to 1000 A. Experiments with 50 mm long and 8 mm diameter tungsten-thorium cathode in a coaxial gas flow show that preheating of the cathode reduces the duration of the instable arc discharge and thus material loss. The use of lighter gases also reduces instability effects, as well as the use of increased pressures and a massive gas influx.
Author

N84-34503# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
T-MOTOR TESTS WITH CYLINDRICAL GRAINS
K. Yeh 16 Jul. 1984 10 p Transl. into ENGLISH from Gongcheng Rewuli Xuebao (China), v. 4, no. 3, Aug. 1983 p 304-306
(AD-A143814; FTD-ID(RS)T-0779-84) Avail: NTIS HC A02/MF A01 CSCL 21/8

Some experimental results are given for T-motor tests with cylindrical grains. These show that within a certain boundary of grain geometry, the response function is independent of the combustion surface area of the propellant.
R.J.F.

N84-34504# Hersh Acoustical Engineering, Chatsworth, Calif.
EXPERIMENTAL INVESTIGATION OF ROCKET MOTOR FLOW-TURNING ACOUSTIC LOSSES Interim Report, Oct. 1981 - Oct. 1983
A. S. Hersh and B. Walker May 1984 125 p
(Contract F04611-81-C-0041)
(AD-A144168; AFRPL-TR-84-009) Avail: NTIS HC A06/MF A01 CSCL 20/1

Results are presented of an experimental investigation of the flow-turning losses associated with the injection of steady lateral

flow into a rectangular duct containing longitudinal acoustic waves. Test results show the flow-turning process absorbs sound. A one-dimensional model was derived that seriously underpredicted the measured acoustic energy losses. Two-dimensional effects in the form of redistribution of the sound pressure due to refraction by the injected mean flow velocity gradients were found to be important. Measurements showed the refraction process to increase the sound pressure at the walls thereby increasing the local wall absorption. Analysis of the data indicates that part of the flow-turning absorption process takes place at the finite admittance side walls and part within the field interior. Most of the sound absorption appears to take place within the fluid interior in support of Culick's ideas, but final interpretation of the data requires the development of a two-dimensional model of the flow-turning process. The identification of the refraction process is new and may have important applications to other rocket motor stability calculations. Key concepts include sound absorption, sound attenuation, sound flow interaction, sound flow energy exchange, flow-turning acoustic losses, and combustion instability. GRA

N84-34505# Messerschmitt-Boelkow-Blohm G.m.b.H., Lampoldshausen (West Germany). Space Div.
EXPLORATORY TESTING OF THE MBB 10 N BIPROPELLANT ENGINE. VOLUME 1: CHARACTERIZATION TESTS Executive Summary
H. Spegele Aug. 1983 99 p refs 2 Vol.
(Contract ESTEC-3273/77/NL-AK)
(MBB-UR-572/82-Vol-1; ESA-CR(P)-1898-Vol-1) Avail: NTIS HC A05/MF A01

The steady state and pulse mode performance of an MBB 10 N bipropellant thruster was investigated by hot firings under vacuum. Although the thruster design was not optimized, in particular the injector-valve interface, and test facility limitations restricted the demonstration of the achievable minimum impulse bit (MIB) to electrical pulse widths (EPW) of 9 msec (valve capability is 5 msec), the tests confirm the potentially excellent performance of the thruster during steady state and pulsed mode performance. No duty cycle limitations due to heat soak back are observed. The achieved MIB for a 9 msec EPW is of the order of 12 mNsec. The temperatures of the thruster chamber remain low, due to the partially regenerative cooling concept. The injector-valve interface must be optimized for better pulse and MIB performance, and the test facility requires improvement for pulsed mode performance verification. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N84-34506*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LEO ATOMIC OXYGEN EFFECTS ON SPACECRAFT MATERIALS: STS-5 RESULTS
Ann F. Whitaker Aug. 1984 22 p refs
(NASA-TM-86463; NAS 1.15:86463) Avail: NTIS HC A02/MF A01 CSCL 11G

Effects of low Earth orbit (LEO) atomic oxygen were measured on a variety of spacecraft materials which obtained exposure on STS-5. Material degradation dependency on temperature was found in one material. Of the five paints flown, only S13GLO was unaffected. Generally, the glossy paints became Lambertian and the diffuse coatings improved. Scanning electron microscope examinations indicated removal of urethane and epoxy paint binder materials. Reaction products were evident on the surfaces of Z302 paint and Mylar. Thin films showed thickness losses ranging from negligible loss in Teflon to considerable loss in Mylar and Kapton. Glossy films such as black Kapton and white Tedlar became diffused. Kevlar 29 rope lost tensile strength and silver solar cell interconnect material oxidized. Oxidation on the backside of an elevated specimen indicated that reflections of oxygen atoms were occurring and that reflecting surfaces, probably Kapton, were not fully accommodating the incident atoms. Author

N84-34507# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A METHOD FOR OBTAINING NEW DERIVED BENZIMIDAZOLES
W. Hahn, W. Strzyzewki, and B. Matecka 25 Jul. 1984 7 p Transl. into ENGLISH from Polish Patent No. 109765, 23 Apr. 1979 p 1-2
(AD-A144320; FTD-ID(RS)T-0794-84) Avail: NTIS HC A02/MF A01 CSCL 07/3

A method for obtaining new derived benzimidazoles, 1,3 (benzimidazolylo-2) 1,3 dicyano-2-phenylopropene is presented. This compound finds application in the creation of dyes. The 2-cyanomethylobezinimidazol is subjected to a condensation reaction with dibenzoyl. The reaction is performed in an alcohol medium in the presence of a base, under mild conditions at room temperature. Author

N84-34508# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CHEMISTRY
25 Jun. 1984 88 p Transl. into ENGLISH from various Russian articles
(JPRS-UCH-84-007) Avail: NTIS HC A05/MF A01

The following topics relating to chemistry are addressed: aerosols, analytical chemistry, biochemistry, catalysis, the chemical industry, coal gasification, combustion, fertilizers, organometallic compounds, organophosphorus compounds, pesticides, petroleum processing technology, pharmacology, toxicology, polymers, polymerization, radiation chemistry, rubber and elastomers, water treatment, and photochemical reactions. For individual titles, see N84-34509 through N84-34511.

N84-34509# Joint Publications Research Service, Arlington, Va.
ELECTROFILTERS FROM POLYMER MATERIALS Abstract Only **c27**
A. A. Moshkin, A. P. Losoto, A. A. Shevchenko, and S. A. Meliksetyan *In its* USSR Rept.: Chem. (JPRS-UCH-84-007) 25 Jun. 1984 p 1 Transl. into ENGLISH from Khim. i Neftyanoye Mashinostr. (Moscow), no. 2, Feb. 1984 p 16-17 (For primary document see N84-34508 24-23)
Avail: NTIS HC A05/MF A01

Electrofilters used to entrap corrosive aerosols in nonferrous metallurgy, mineral fertilizer production, and other industries are made of nickel-containing stainless steel, lead, ferrosilide, and other costly and scarce metals. Replacing these metals with polymers requires a study of their behavior under the effects of constant corona discharge and spark over in the electrode gap, and in the presence of a chemically corrosive medium. The stability of the polymers under these conditions was shown previously to depend on the thermal and fire-resistance of the polymers. The effects of various carbon fillers on the thermal conductivity of polyethylene and polypropylene polymers were investigated. Acetylene carbon black is highly adsorptive and its particles become enveloped with the polymer material, while graphite is an inert filler in polypropylene. Because of similarity in structure, a carbon black, graphite-filled polymer system provides high electro-thermal conductivity. Various electrode materials were processed, resulting in a savings of 500,000 rubles. R.S.F.

N84-34510# Joint Publications Research Service, Arlington, Va.
POLYMERS AS SUBSTITUTES FOR METAL AND LUMBER **c27**
A. Musifulin *In its* USSR Rept.: Chem. (JPRS-UCH-84-007) 25 Jun. 1984 p 41-50 Transl. into ENGLISH from Planovoye Kohzyaystvo (Moscow), no. 1, Jan. 1984 p 109-113 (For primary document see N84-34508 24-23)
Avail: NTIS HC A05/MF A01

The replacement of metal, wood, and other materials by synthetic resins and polymers is discussed in relation to the U.S.S.R. The potential savings of metal and lumber are enumerated.

The economic requirements for, and the economic impact of, a large scale transition to polymers are discussed. R.S.F.

N84-34511# Joint Publications Research Service, Arlington, Va.
POLYACETYLENE AND K **c27**
V. Mishin *In its* USSR Rept.: Chem. (JPRS-UCH-84-007) 25 Jun. 1984 p 51-60 Transl. into ENGLISH from Khim. i Zhizn (Moscow), no. 3, Mar. 1984 p 23-28 (For primary document see N84-34508 24-23)
Avail: NTIS HC A05/MF A01

The historical development of the semiconductor material polyacetylene is traced. The capability of polyacetylene to be used instead of silver, selenium, graphite, silicon, and lead in certain applications is discussed. The width of the forbidden zone in polyacetylene is also addressed. R.S.F.

N84-34512# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MATERIALS SCIENCE AND METALLURGY, NO. 94
28 Dec. 1983 62 p Transl. into ENGLISH from various Russian articles
(JPRS-85025) Avail: NTIS HC A04/MF A01

Topics of materials science and metallurgy covered include aluminum and its alloys; analysis and testing; composite materials; energy effects; ferrous metallurgy; magnesium; minerals; powder metallurgy; steels; superalloys; superhard materials; thin films; titanium; and welding. For individual titles, see N84-34513 through N84-34532.

N84-34513# Joint Publications Research Service, Arlington, Va.
ATTACHMENT FOR AN X-RAY DIFFRACTORMETER FOR STUDYING TRANSFORMATIONS IN MATERIALS Abstract Only **c26**
L. A. Monasevich and Yu. I. Paskal *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 4 Transl. into ENGLISH from Zavodsk. Lab. (Moscow), no. 7, Jul. 1983 p 32-34 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

X-ray structural analysis was used to study the role of matensite phase transformations in form memory of titanium nickelide alloys. Relative intensity of X-ray images of high-temperature austenite and martensite phases as a reversible transformation related to form memory through use of an attachment that permits thermocycling of materials with constant stretching load and deformation in isothermal conditions, as well as automatic recording of temperature dependence on intensity of X-ray reflections are considered. A schematic diagram is given and the role of individual components is discussed. The broad aperture of the counter permits analysis of the full breadth of lines defining the martensite and austenite phases. Parallel readings of temperature and deformation values permit direct X-ray structural analysis of the alloys. Author

N84-34514# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF STRESS-DEFORMED STATE OF THREE-LAYER SHELLS MADE WITH ANISOTROPIC HIGH-MODULE COMPOSITE MATERIALS Abstract Only **c24**
V. U. Kotelnikov, S. V. Mokryy, I. A. Sergeyev, A. A. Chernov, and G. I. Yurin *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 6-7 Transl. into ENGLISH from Mekh. Kompozitnykh Materialov (Riga), no. 4, Jul. - Aug. 1983 p 642-647 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Little research was done on three-layer cylinders with carbon-reinforced plastics for load-bearing applications. Such products are compared to identical fiberglass shapes. Test samples were made of Lu-3 carbon ribbon filler in an epoxy-phenol matrix. Various bushings were attached to the outside of the cylinder, and load layers of the shell corresponded to orthogonal anisotropic elastic and durability properties. The Jung module was determined for ring and meridian directions on blade-shaped samples that were identical to the cylinders in physico-mechanical properties. A special test stand designed for these experiments is described. No axial strength was noted, and the material's external anisotropy did not affect durability. Contact and continuous deformation values indicated that the greatest shock extent for carbon-reinforced shells did not exceed 140 cm, while for fiberglass the maximum was 170 cm. The most effective reinforcement designs are summarized. Author

N84-34515# Joint Publications Research Service, Arlington, Va.
AN APPROACH FOR ESTIMATING THE IMPACT OF CARBON-REINFORCED PLASTIC Abstract Only **c27**
K. K. Dudka, I. N. Preobrazhenskiy, and A. S. Shestakov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 7 Transl. into ENGLISH from Mekh. Kompozitnykh Materialov (Riga), no. 4, Jul. - Aug. 1983 p 624-628 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Fiber reinforced composite materials for aircraft require both usual design qualities and special impact strength. Devices designed for testing impact resistance, consisting of a high pressure chamber, a pneumatic rifle, a muzzle break and meters are presented. The test samples were of KMU-4L carbon reinforced plastic laminated at 0, 0 to 90 degrees or + or - 45 degrees. At 0.0396 joule force from fired balls, the test samples showed local damage. With increased load, increasing degrees of cracking occurred. Results indicated that the test plastic was a brittle material under impact. Maximum loss of durability came at energies approaching penetrating force. Prior compression loading brought loss of bearing strength. Varying angles of laminating led to different blow absorption values. Comparison of these results with those for fiberglass suggested the feasibility of composites of carbon-reinforced plastics and low-module fiberglass. Author

N84-34516# Joint Publications Research Service, Arlington, Va.
FRACTURE TOUGHNESS OF CRYSTALLINE AND COMPOSITE SUPERHARD MATERIALS Abstract Only **c24**
N. V. Novikov and A. L. Maystrenko *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 8 Transl. into ENGLISH from Fiz.-Khim. Mekh. Materialov (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 46-53 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Determining the fatigue toughness of brittle high-strength materials requires special specimens and special loading techniques, inasmuch as cracks cannot be initiated by standard methods on account of the critical stress intensity being very low (K (sub Ic) < 10 MPa.m (supra 1/2)) and the Vickers hardness being very high (HV > 10 GPa). An assortment of seven shapes of specimens, with dimensions based on corresponding theoretical reactions for the stress intensity coefficient, is shown for consideration. From these are selected the most suitable ones for testing various natural and synthetic materials in single-crystal or polycrystalline form such as diamond and graphite, granite and marble, as well as hard ceramics (oxides, carbides, nitrides) and fused quartz. A procedure was developed for preparing such specimens for first static loading in automatic Treshchina equipment with UM-5 (50 kN) tensile machine and SOU-1 minicomputer and then dynamic loading in gravitational impact equipment with drop hammer and Hopkinson measuring rod. Special frameless resonance type loading devices were developed which absorb all stored elastic energy during subcritical crack growth so as to prevent avalanche cracking to fracture. Author

N84-34517# Joint Publications Research Service, Arlington, Va.
SEIZING IN FRICTION OF COMPOSITE MATERIALS WITH DIFFERING PHASE COMPOSITIONS Abstract Only **c24**
V. P. Bondarenko *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 9 Transl. into ENGLISH from Sverkhtverdyye Materialy (Kiev), no. 4, Jul. - Aug. 1983 p 19-27 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Growing interest in durable antifriction composites led to the analysis of the conditions causing seizing during friction and development of ways to reduce it by creating composites with optimum phase composition. The two causes of such seizing,

deformation and excessive temperature, are taken into account in calculations that include factors for both parts involved, fillers in each part, components of those fillers, dimensions of uneven surface elements, relative filler volume and component functioning in inert gas or high vacuum. The results of calculations indicated that bearing materials should include more resilient materials than those of the support parts. This permits greater loading than is possible when single component materials are used. Chromium carbide alloys with revolving liquid bearings were judged to be highly promising. Author

N84-34518# Joint Publications Research Service, Arlington, Va.
HARDENING ALLOY SURFACES BY LASER IRRADIATION Abstract Only **c26**
A. G. Grigoryants, A. N. Safonov, V. M. Tarasenko, N. A. Makusheva, Ye. V. Kauts, and T. V. Gulyayeva *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 10 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekh. (Moscow), no. 9, Sep. 1983 p 124-131 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Structure and properties of surface layers of industrial alloys after treatment with continuous lasers were investigated. Metals included various brands of steel, chromium-nickel iron, aluminum and titanium alloys and bronzes. Phosphate, graphite and metal oxide coatings were used to increase absorption of the CO2 laser irradiation. Then metallographic cross-section studies were made to determine tempering effects. Expected results were obtained with increasing laser power and reduction of processing rate; a side effect of increased tempering is attributed to overall heating of test samples. Increased power and reduced processing rate brought reduction in average surface microhardness. Martensite conversions were considered to be the key to laser tempering, as for normal tempering, of steels and irons. Factors resulting from the difference in melting versus non-melting procedures are discussed for the tested metals. Low carbon steel did not respond greatly to laser processing, gaining only 100 units of microhardness in the processing. Alloys of titanium, aluminum and some copper variants gained significantly in microhardness by laser irradiation tempering. Author

N84-34519# Joint Publications Research Service, Arlington, Va.
THERMAL EFFECT OF PULSED LASER IRRADIATION ON THE SURFACE OF METALLIC MIRRORS Abstract Only **c26**
V. F. Gordeyev, A. L. Glytenko, and G. M. Kudinov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 12 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekh. (Moscow), no. 9, Sep. 1983 p 110-117 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Growing use of metallic mirrors in laser technology led to the study of thermal effects of irradiation that lead to irreversible deformations. This occurs through applied tension, concentrator effectiveness and internal friction in the material. Limited by granular density (granules that surface on mirrors), plastic creep occurs only in a single plane. Microplastic deformtion grows through a stage where flow occurs in individual granules after an elasticity limit was reached, and in a stage of cooperative macroscopic creep. Calculations are presented for the growth of thermal tension and plastic deformation. Rapid temperature increases bring thermomechanical tension that eases as the surface is approached, reaching zero at the surface. The most favorable structure has a creep plane approaching 45 degrees. Subsequent cooling through dissipation brings diminished thermal tension, but deformation does not disappear, and gradually the metallic mirror becomes defective and unusable. Author

N84-34520# Joint Publications Research Service, Arlington, Va.
METALLOGENIC STUDIES IN KAZAKHSTAN OUTLINED **c46**
A. Abdulin *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 21-23 Transl. into ENGLISH from Kazakhstanskaya Pravda (Alma-Ata), 6 Sep. 1983 p 2 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Metallogeny is one of the most important of the main branches of geology, and is a new and developing science. Kazakhstan, because of its geological structure and mineral wealth, is an exceptionally favorable zone for metallogenic research. In its territory there are geological formations of all types, and one of the most varied composition and origins - distinguished by a variety of minerals and beds and by an extensive collection of useful minerals. An analysis was made of the regularities observed in the formation and distribution of useful metal deposits in the mining areas of the country. Recommendations and map legends from metallogenic studies are requested to serve as a basis for the compilation of metallogenic prognosis maps. B.G.

N84-34521# Joint Publications Research Service, Arlington, Va.
EFFECT OF STRETCH RATE ON TEXTURE AND MECHANICAL PROPERTIES OF NICKEL-COBALT ALLOYS Abstract Only **c26**
O. A. Kraskina, E. N. Spektor, and G. N. Epshteyn *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 31 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 5, Sep. - Oct. 1983 p 158-160 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

While the effect of deformation rate on structure formation of metals has received considerable attention, textural dependence on deformation rate was not addressed. Stretch rate in a range of .00019 to 19 as it affected nickel and a 40% cobalt nickel alloy with up to 40% deformation, examining direct polar figures in comparison to a standard untextured sample were studied. Above a critical deformation rate, flow tension increased with the increase of deformation rate. For nickel and the cobalt nickel alloy, that rate equalled .019. As deformation increased, the increase in flow tension related to growing load rate diminished. Texture was found to be distributed along the direction of stretching in proportion to the amount of deformation, indicating the formation of an axial component of texture. A twin orientation that emerged was stronger in the alloy of nickel with 40% cobalt than in nickel alone. Author

N84-34522# Joint Publications Research Service, Arlington, Va.
DEVICE FOR HIGH FREQUENCY ARC WELDING Abstract Only **c37**
N. G. Sinelnikov and G. P. Fetisov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 39 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 37-38 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Arc welding uses are significantly expanded by high frequency energy transformers that provide short, powerful impulses. Such a process is especially applicable for joining thin walled parts with varying thermophysical properties and thicknesses; cost savings can be as much as 75% over electron beam methods and heat input at the seam is 30% lower than with low frequency pulsating beam welding. A computer controlled, rapid action and precision welding apparatus is described. A manually operated version is also presented. The rectifier and arc are monitored by voltmeters and the welding current by ammeters. Author

N84-34523# Joint Publications Research Service, Arlington, Va.
CONTROL OF SEAM FORMATION IN WELDING WITH A LIGHT BEAM Abstract Only **c37**
S. A. Fedorov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 39 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 29-30 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Xenon light beam welding of thin metals without perforation determines seam formation and is dependent on the surface of the liquid metal as well as factors in the welding tank. Since titanium alloys do not manifest capillary effects, controlling surface tension permits control of final seam form. With chromium nickel austenite steels, argon with 0.5 to 1.0% oxygen should be used as a protective gas. Another approach is to control temperature

loss in the tank. Advantages of using an ellipsoid reflector and a diaphragm to control welding spot size are summarized. Conical nozzles for further concentration of light beam energy were also found effective for the seam of thin metal and preventing undesirable perforation. Author

N84-34524# Joint Publications Research Service, Arlington, Va.
EFFECT OF PROTECTIVE GAS COMPOSITION ON SEAM FORMATION DURING LASER WELDING Abstract Only c37
V. V. Kovalev, A. V. Surkov, and N. M. Novozhilov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 40 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 20-21 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Inert gas used in laser welding to eliminate air from the reaction zone and reduce absorption and focus dispersion was studied during the welding of perlite 10GN2MFA and austenite 08Ch-18N10T with continuous CO2 laser welding at 25 meters/hour. Protective gas, delivered through a cylindrical nozzle, included helium, argon, CO2, nitrogen, oxygen and mixtures of them. Pores in seam metal and absorption of the laser beam in the welding flare were recorded. Best seam formation, with a finely scaled surface, was found when helium was used in mixtures containing 70% He and 30% of either oxygen or nitrogen. Seams in 08Ch18N10T steel lacked either pores or cracks; pure helium provided best melting during irradiation with this steel. When other factors were considered, the best protective gas for the perlite steel was CO2 or a mixture of 70% CO2 and 30% CO2 while for the austenite steel, helium, CO2 or a mixture 70% He and 30% N2 were recommended. Author

N84-34525# Joint Publications Research Service, Arlington, Va.
FEATURES OF LASER WELDING OF AMg6 ALLOY Abstract Only c37
A. G. Grigoryants, I. N. Shiganov, V. V. Ivanov, A. M. Pashkevich, V. M. Solovyev, and A. V. Khvorost *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 40-41 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 17-19 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Use of aluminum alloys for body parts is a growing need in production of automobiles, ships, railroad cars, and aircraft. Welding large parts leads to deformation that requires much labor to eliminate. Use of laser welding in place of electron beam methods is considered, since the former eliminates the need for vacuum chambers and permits unlimited seam length, welding of joints that are difficult, and use of a single energy source for several operations. Using a domestic Soviet LTI-Z CO2 laser with maximum power of 5 kwt, focused with a potassium chloride planoconvex lens, current knowledge was expanded. Results indicated that at 50 m/hr, similar seams resulted with laser and electron beam methods; thereafter the depth of melting increased with the laser, reaching a depth twice that of the control at 150 m/hr. The laser, however, had no better than 0.65 efficiency, while the electron beam had no worse than 0.9. Author

N84-34526# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND PROPERTIES OF AMORPHOUS POWDER MATERIAL AFTER EXPLOSIVE LOADING Abstract Only c26
O. V. Roman, A. P. Boganov, Yu. N. Voloshin, V. G. Gorobtsov, and I. M. Pikus *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 45 Transl. into ENGLISH from Metalloved. i Term. Obrabotka Metal. (Moscow), no. 10, Oct. 1983 p 57-59 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Explosive loading of a powder of an amorphous Fe40Ni-40P14B6 alloy was performed by throwing a steel plate and axisymmetrical compression in an ampule with a charge of explosive. The loading parameters used to produce flat specimens were selected so as to provide a throwing speed of the plate of 500 to 1000 m/s, corresponding to a range in mean temperature through the volume of 600 to 1400 K. Density of the specimens after explosive pressing was determined by a hydrostatic method to be 83 to 96%, depending on loading conditions. Microhardness increased slightly with increased impact speed, from H620 to H710. The nature of the change in close order in specimens was studied by X-ray diffractometry. The width of the first maximum of the structure factor was used to estimate dimensions of the areas of coherent scattering. Thermophysical properties were studied by differential scanning calorimetry. The nature of bonds between particles was studied on a scanning electron microscope. Analysis of fractures and microsections shows that particles could be joined by a cold weld or a weld with local melting of contacting sectors. Author

N84-34527# Joint Publications Research Service, Arlington, Va.
ANODIC ELECTROCHEMICAL PROCESSING OF AMORPHOUS ALLOYS Abstract Only c26
N. I. Isayev, V. B. Yakovlev, E. K. Osipov, Ye. A. Trofimova, and V. Yu. Vasilyev *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 46 Transl. into ENGLISH from Metalloved. i Term. Obrabotka Metal. (Moscow), no. 10, Oct. 1983 p 54-57 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

The specifics of the process of anodic oxidation and the properties of anodic oxide films formed on the surface of amorphous alloys were determined. Amorphous alloys based on metals in the systems Zr-Ni, Zr-Cu-Ni, Zr-Al-Ni, Zr-Cu-Sn, Zr-Al and Zr-Mo were studied. Specimens were produced by melting in the suspended state with subsequent hardening of the melt on a spinning copper disk. The structure of the alloys was tested by methods of X-ray diffractometry, electron microscopy, and also from the change in resistivity upon heating, indicating conversion of the alloy to the crystalline state. Oxidation was performed with electrolytes which did not dissolve or only very slightly dissolved the oxide film: a boric acid electrolyte and a 20% H2SO4 solution. Galvanostatic and potentiostatic oxidation were performed. The nonvalve components of the alloys inhibited the process of oxidation, and in aqueous electrolytes it practically did not occur. Amorphous alloys containing only the valve components were anodically oxidized and the regularities of film growth were similar to those obtained for crystalline materials. Author

N84-34528# Joint Publications Research Service, Arlington, Va.
AMORPHOUS METALLIC MATERIALS Abstract Only c26
Yu. K. Kovneristyy *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 46-47 Transl. into ENGLISH from Metalloved. i Term. Obrabotka Material. (Moscow), no. 9, Sep. 1983 p 2-9 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

The scientific curiosity of amorphous phases in Au-Si systems has given way to practical interest in magnetic, electric, anticorrosion and mechanical properties of such alloys in comparison to crystalline structures, but thinness of semimanufactured goods and poor thermal stability and properties continue to prevent wide application. Since studies using geometric approaches do not give comprehensive results, atomic tension and the coefficient of local symmetry as parameters were added, and a computer model to calculate defects of amorphous body structure developed. Atomic clusters were found to contain local structures that diverged greatly from average values. Physiochemical parameters of individual initial components and their interactions in given systems were found to determine specific properties of an amorphous system. Both theoretical studies and experimental research are needed to determine the metastable state of such systems. Nonferrous metals including refractory metals have more stable electromagnetic, mechanical and other properties than those based on iron, and some, such as titanium, also provide greater durability and corrosion resistance. Author

N84-34529# Joint Publications Research Service, Arlington, Va.
FATIGUE CRACK GROWTH IN VACUUM AND IN GASEOUS MEDIA Abstract Only c39

S. Ya. Yarema *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 49 Transl. into ENGLISH from Fiz.-Khim. Mekh. Material. (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 37-46 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

The effect of air on fatigue cracking was investigated using flat disk specimens of various steels and aluminum alloys each having a central crack. The tests were performed inside a hermetic chamber containing laboratory air at varying pressure down to a vacuum of 3 mPa, containing air with varying humidity down to 0.1% (dry), containing only oxygen, or containing only nitrogen. Results indicate a dependence of the fatigue cracking rate on the air pressure and a threshold pressure of approximately 10 Pa, above which it remains almost constant and below which it decreases fast before again stabilizing at approximately 1 Pa in both aluminum alloys. The curves of fatigue cracking rate as function of the stress intensity coefficient in all materials and under all conditions have a steep initial range and a steep final range with a range of slower cracking in between. Fatigue cracking in oxygen is almost the same as in dry air and thus also somewhat anomalous. Fatigue cracking in nitrogen is almost the same as under vacuum, except that it accelerates smoothly under light loads. Author

N84-34530# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF RATE OF GROWTH IN AQUEOUS CORROSIVE MEDIUM ON ELECTROCHEMICAL CONDITIONS AT TIP OF CRACK Abstract Only c39
V. V. Panasyuk, L. V. Ratych, and I. N. Dmytrakh *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 49-50 Transl. into ENGLISH from Fiz.-Khim. Mekh. Material. (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 33-37 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Rectangular bar specimens of 40Kh13 10 x 20 mm in cross section and 150 mm long with fatigue cracks of various lengths were immersed in a solution of 1% H3BO3 in distilled water. The specimens were preloaded in air cyclically below and beyond the critical stress level at the crack tip. Results reveal that the electrochemical conditions are different at the crack tip and at the surface, the difference depending on the stressed-strained state as well as on the crack length and changing in time. The diagrams of fatigue cracking in a corrosive medium, plotted on the basis of these data for 40Kh13 steel, indicate that electrochemical conditions favorable to a given metal-electrolyte system with respect to higher cracking resistance can be attained through control of the external polarization potential. Author

N84-34531# Joint Publications Research Service, Arlington, Va.
MODERN METHODS OF STUDYING INITIAL STAGE OF FATIGUE FRACTURE IN METALS Abstract Only c26
V. I. Pokhmurskiy, Yu. V. Dzoba, and N. Ya. Yaremchenko *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 50 Transl. into ENGLISH from Fiz.-Khim. Mekh. Material. (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 3-14 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

Modern methods used for studying the initial stage of fatigue fracture in metals are based on either of two different approaches. In the first approach the number of cycles until microcracks of a certain length appear is determined. This approach is more controversial, inasmuch as the number of cycles is somewhat arbitrarily defined. The second approach involves physically determining the structural changes in a metal at the submicroscopic level and the kinetics of fatigue defects buildup, so that the mechanism of crack nucleation can be established on the basis of experimental data. This approach requires development of additional methods and better instruments. Methods based on it are: (1) optical ones using a metallographic microscope or high-speed microphotography and recently, optical holography; (2) physical ones using exoelectron emission, acoustic emission, or electric eddy currents; (3) mechanical methods of measuring the buildup of inelastic strains; and (4) electrochemical methods involving both corrosion and fatigue fracture. Author

N84-34532# Joint Publications Research Service, Arlington, Va.
CARBIDE PHASES IN HIGH-TEMPERATURE NICKEL-HAFNIUM ALLOYS Abstract Only c26
S. T. Kishkin, G. B. Stroganov, A. V. Logunov, Ye. A. Kuleshova, I. M. Khatsinskaya, and N. V. Petrushin *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 51 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 5, Sep. - Oct. 1983 p 143-149 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

The role of carbide in high-temperature nickel alloys is complex. It includes prevention of recrystallization, thus increasing resistance to temperature failure. Concentration-temperature ranges and structural stability of various carbide phases and morphologies for alloys of the system Ni-Cr-Co-W-Al-Ti-Nb-Ni-C, prepared in vacuum induction ovens with directed crystallization were studied. Carbide phase chemistry was calculated using a Samara computer program, while morphology was studied by optical and electron-microscopic methods, and melting and crystallization by differential thermal analysis. Results indicated that morphological and chemical differences in carbides were related to temperature of formation, while MeC carbides crystallized out of the fusion. In high-temperature alloys with 0.1/0.17% C, MeC carbides were of eutectic origin. High-dispersion particles were secondary carbides emitted in disintegration of the gamma-solid solution. Faceted carbides (Nb, Hf, Ti)C and (Ti, Nb)C formed at higher temperatures than (Ti,Nb)C carbides with a linear morphology. The modifying effect of hafnium on the carbide structure caused the temperature differential. Author

N84-34533# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MATERIALS SCIENCE AND METALLURGY, NO. 91
16 Aug. 1983 1 p Transl. into ENGLISH from various Russian articles
(JPRS-84129) Avail: NTIS HC A04/MF A01

Granule metallurgy is separate from powder metallurgy, since granules are always produced by spraying of alloy into droplets which crystallize at very high cooling rates, over 1000 C per secnd. Granule metallurgy is most effectivly used for alloys which form nonequilibrium structural states which are rather stable at high crystallization speeds. Granule Technology can be most effective for specially alloyed alloys with high content of transition metals and certain other alloying components of low solubility. The structure of granules of an aluminum alloy containing 8% Fe with a cooling rate of 1,000,000 C/sec is studied. It is found that in the anomalously supersaturated solid soluton there is about 0.05% Fe, the remaining iron being present as an intermetallide phase in highly dispersed form, dendritic cell size about 0.01 micron, producing a very high level of hardness. For individual titles, see N84-34534 through N84-34570.

N84-34534# Joint Publications Research Service, Arlington, Va.
SIGNIFICANCE OF THE ENVIRONMENT IN CORROSION CRACKING OF Al-Mg AND Al-Li-Mg SYSTEM ALLOYS Abstract Only c26
L. A. Kurtasova and V. M. Polyanskiy *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 1 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Lvov, USSR), v. 19, no. 2, Mar. - Apr. 1983 p 29-34 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Both oxygen and water must be present for corrosion cracking of aluminum alloys to occur in liquid or gaseous media. Since the interaction of the metal with oxygen and water is accompanied by the formation of oxides, the generation of excess concentration of vacancies at the metal-oxide boundary, when the mechanism of oxidation is determined by diffusion of cations through the oxide film to the boundary with the atmosphere, must be important. The purpose of this work is to study these phenomena in Al-8.5-11.5%

Mg and Al-2%Li-6%Mg and estimate their role in the mechanism of corrosion cracking of these alloys. The object of the study was alloys in the two systems heat treated by hardening and aging for up to 10 years. Thin foils were examined in an electron microscope. Crack growth rate was measured in specimens with a fatigue crack. The distribution of alloying elements among the grain boundaries was indirectly determined. It was demonstrated for the first time that the formation of an oxide film on the surface of a corrosion crack, facilitating the development of excess vacancies in the metal, can help to increase the sensitivity of an alloy to corrosion cracking. Author

N84-34535# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND PROPERTIES OF GRANULATED ALUMINUM ALLOYS CONTAINING TRANSITION METALS Abstract Only c26

V. I. Dobatkin, V. I. Yelagin, and V. M. Fedorov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 2 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 3, May - Jun. 1983 p 93-96 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Granule metallurgy is separate from powder metallurgy, since granules are always produced by spraying of alloy into droplets which crystallize at very high cooling rates, over 1000 C per second. Granule metallurgy is most effectively used for alloys which form nonequilibrium structural states which are rather stable at high crystallization speeds. Granule technology can be most effective for specially alloyed alloys with high content of transition metals and certain other alloying components of low solubility. The structure of granules of an aluminum alloy containing 8% Fe with a cooling rate of 1,000,000 C/sec is studied. It is found that in the anomalously supersaturated solid solution there is about 0.05% Fe, the remaining iron being present as an intermetallide phase in highly dispersed form, dendritic cell size about 0.01 micron, producing a very high level of hardness. B.W.

N84-34536# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF NATURAL EXPOSURE IN SPACE ON PHYSICAL-MECHANICAL PROPERTIES OF CARBON REINFORCED PLASTIC Abstract Only c24

G. M. Gunyayev, M. I. Dushin, Yu. N. Ivonin, L. A. Kvacheva, V. V. Mikhaylov, Ye. F. Nikishin, and O. V. Startsev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 5 Transl. into ENGLISH from Mekhan. Kompozitnykh Materialov (Riga), no. 2, Mar. - Apr. 1983 p 211-215 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

A study is described of the long-term effect of ionizing radiation, sunlight unshielded by the atmosphere and the temperature variations in space on the physical and mechanical characteristics of a composite to determine whether the material can be used in space equipment. The composite, standard type KMU-31, was exposed in open space for 304 and 686 days. Partial destruction of the binder was observed, causing partial loss of polymer from the irradiated surface and a decrease in dynamic elasticity modulus and speed of sound. Shielding of the surface with a protective film eliminated damage to the surface. Additional cross bonding occurred due to the formation of reactive groups, and internal stresses were relieved and the structural homogeneity of the binder increased, improving a number of physical and mechanical characteristics and expanding the usage temperature range and stabilizing the physical and mechanical characteristics. In general the material retained good operating characteristics and performance over a broad rane of temperatures. Author

N84-34537# Joint Publications Research Service, Arlington, Va.
COMPOSITE MATERIALS WITH ALUMINUM MATRIX REINFORCED WITH CARBON FIBERS Abstract Only c24

A. A. Zabolotskiy, V. Ya. Varshavskiy, T. D. Karimbayev, and V. I. Pavlov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 6 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 59-64 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

A process developed in Japan and the USSR is described for metallurgical manufacture of carbon-aluminum composites--the method of forced saturation. Fibers are laid in a mold together with a powder of the matrix metal or an alloy, the mold is heated until the matrix alloy melts, pressure is applied and the composite is held for a time. The quality of the material formed is determined by the interaction of the components. If the components do not interact sufficiently the material will break due to the low strength of the phase division boundary. If the interaction is excessive a major crack will form as the weaker fibers break and propagate without hinderance through the division boundary between fiber and matrix. The interactions of the components can be changed by changing the properties of either the fiber or the matrix. It is mentioned that there are extensive programs for the study of the possibility of using carbon-aluminum fibers in various areas of technology in the USA. B.W.

N84-34538# Joint Publications Research Service, Arlington, Va.
HIGHLY POROUS POWDER-FIBER COMPOSITE MATERIALS Abstract Only c24

A. G. Kostornov, N. Ye. Fedorova, and L. I. Chernyshev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 6 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 53-56 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Volumetric changes occurring upon sintering of highly porous powder-fiber composites are studied. Their physical-mechanical and hydrodynamic properties are studied. The materials studied were type PNK-1 carbonyl nickel powder fiber produced by cutting of 50 micron diameter wire. High porosity was achieved by introducing a volatilizing pore forming substance--ammonium bicarbonate, particle diameter 0.08-0.125 micron. It is shown that volume changes can be significantly inhibited upon sintering of such highly porous materials by introducing the fiber into the powder mixture. The mechanism of sintering of powder-fiber composites with over 25% fiber content is similar to the mechanism of sintering of pure fiber materials. The mechanical characteristics of permeable composite materials are determined by the fiber component, the hydrodynamic characteristics by the powder component. B.W.

N84-34539# Joint Publications Research Service, Arlington, Va.
FRACTURE MECHANISM OF CARBON AND BORON REINFORCED PLASTICS WITH SHEAR BETWEEN LAYERS Abstract Only c24

L. P. Kobets, V. V. Mikhaylov, and O. N. Nadezhina *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 7 Transl. into ENGLISH from Mekhan. Kompozitnykh Materialov (Riga), no. 2, Mar. - Apr. 1983 p 251-256 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Durability of carbon and boron reinforced plastics was studied in long term shear stress between layers. Materials with unidirectional boron and boron-glass filaments in combination with epoxy polyisocyanate binder and carbon fiber with epoxy triphenol, epoxy aniline phenol-formaldehyde and epoxy novolak binders containing a complex of boron trifluoride and benzylamide were tested. Additional structural studies will be required to allow reliable interpretation of the experimental results. As yet, it can be said that when the force field is applied to the composite, the disoriented globular structure is oriented, particularly at temperatures higher than the temperature at which the physical bonds break down (first glas point). Orientation of the block structure in the direction of force application is the result of local highly elastic deformation as accompanied by significant strengthening of the matrix. The primarily cohesion nature of failure of the epoxy-novolak matrix at high load levels results largely from its firm mechanical bonding to the fibers. Author

N84-34540# Joint Publications Research Service, Arlington, Va.
PLANNING OF PLATES REINFORCED WITH EQUALLY

STRESSED FIBERS OF CONSTANT CROSS SECTION Abstract Only c24

S. B. Bushmanov and Yu. V. Menirovskiy *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 7 Transl. into ENGLISH from Mekhan. Kompozitnykh Materialov (Riga), no. 2, Mar. - Apr. 1983 p 278-284 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

Plates consisting of an isotropic matrix with fibers of constant cross section laid in the planes of the plates are studied. It is assumed that the plates have constant thickness and that they are exposed to generalized planar stress states. Both phases of the composite are considered linearly elastic. The problem of planning of a plate reinforced with two sets of equally stressed fibers of constant cross section is first studied mathematically, after which the problem of planning of a plate reinforced with one set of equally stressed fibers of constant cross section is discussed. As an example, the planning of a circular plate reinforced with two sets of equally stressed fibers of constant cross section is analyzed. B.W.

N84-34541# Joint Publications Research Service, Arlington, Va.

PROCESSING THE RESULTS OF FATIGUE TESTING OF STRUCTURAL MATERIALS DAMAGED BY CORROSION Abstract Only c39

N. F. Boronkin, R. G. Gaynutdinov, A. V. Karlashov, A. M. Svintsitskiy, and A. A. Burdak *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 10 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Lvov, USSR), v. 19, no. 2, Mar. - Apr. 1983 p 83-86 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

An exponential equation is suggested to describe the experimental relationship between fatigue durability of pressed corner pieces of V95T1 alloy and preliminary corrosion test duration. Plates are corrosion tested from 18 t0 20 C in a model condensate, and from 42 to 45 C in a 3% sodium chloride solution. The corrosiveness of the two media in terms of their effect on fatigue strength is practically identical. An equation is derived which can reliably predict fatigue durability following exposure to corrosive media. M.A.C.

N84-34542# Joint Publications Research Service, Arlington, Va.

PASSIVATION OF AMORPHOUS ALLOYS WITH VARIOUS PHOSPHORUS CONTENTS Abstract Only c26

V. Yu. Vasilev, M. V. Zudin, and N. N. Rodin *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 10-11 Transl. into ENGLISH from Zashchita Metallov (Moscow), v. 19, no. 3, May - Jun. 1983 p 401-404 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

The influence of phosphorus content on the corrosion amorphous Fe-Cr-P-C and Fe-Cr-P alloys in hydrochloric acid is examined in which such alloys can be passivated without pitting. The amorphous nature of the structure is monitored by X ray studies and differential scanning calorimetry. With an increase in the content of phosphorus in the alloy from 9 to 15% the critical passivation current decreases by more than two orders of magnitude. An increase in phosphorus content in the amorphous alloy thus helps to increase its passivation properties. Increasing the content of phosphorus from 9 to 18% in Fe-Cr-P-C alloys and from 13 to 20% in Fe-Cr-P alloys increases the concentration of HCl by factors of 15 and 4, which cannot be attributed to enrichment of the surface with chromium, since the chromium dissolution selectivity factor is identical for all these alloys and independent of phosphorus content. The increase in critical HCl concentration results from structural changes in the amorphous alloys with an increase in phosphorus content. M.A.C.

N84-34543# Joint Publications Research Service, Arlington, Va.

MATCHED EVAPORATION OF ALLOYS IN A VACUUM Abstract Only c26

Yu. D. Klebanov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 12 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 111-113 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

A study is made of matched evaporation of multicomponent alloys, i.e., evaporation without fractionation. Equations are derived which define the conditions under which matched evaporation of a multicomponent alloy in a vacuum occurs. The specifics of matched evaporation of two- and three-component alloys are discussed and it is shown that regardless of the behavior of activity coefficients as a function of composition the status of matched evaporation is achieved only after a certain fixed mass of the alloy has evaporated. The results produced can be used to optimize the technological parameters of the process of producing coatings of assigned chemical composition by evaporation in a vacuum. Author

N84-34544# Joint Publications Research Service, Arlington, Va.

THERMAL PHYSICS OF PLASMA ATOMIZATION ONTO FIBER MATERIALS Abstract Only c26

Ye. M. Ivanov and V. V. Kudinov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 12-13 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 46-51 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

A study is made of the process of solidification of a liquid film at the crystallization temperature as a part of the process of producing fiber composite materials by plasma atomization of liquid particles onto a microscopic fiber base. The film is applied to a cylindrical substrate at a known initial temperature. The liquid film is thus a hollow cylinder with known inner and outer radii. Conditions of crystallization of the film due to heat transfer into the depth of the cylindrical fiber are mathematically studied. This is followed by a mathematical study of the conditions of crystallization of the film from the outside due to radiation cooling into the surrounding environment which has a known temperature, less than the surface temperature of the solidifying film. Equations are produced which allow analysis of the thermophysical processes involved in plasma atomization onto fibers and a proper approach to the selection of an atomization technology in order to produce a strong bond between fiber and matrix. Author

N84-34545# Joint Publications Research Service, Arlington, Va.

DYNAMIC STRESS IN ELASTIC AREAS DEVELOPING UPON INTERACTION OF INTENSIVE HEAT FLUXES WITH SOLID BODIES Abstract Only c39

E. M. Kartashov, V. M. Nechayev, V. A. Shmakov, and G. M. Bartenev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 13 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 29-38 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

The thermoelastic reaction of a solid body exposed to sudden temperature changes is investigated. Two effects are considered: (1) surface evaporation of the material when exposed to concentrated energy fluxes and (2) dynamic effects caused by the movement of particles of the solid body during rapid thermal expansion. Internal stresses in the surface layer, the effect of the velocity of movement of the boundary surface of the body on distribution of internal stresses, time of action of inertial effects, and cases of thermal effect of pulses are studied. M.A.C.

N84-34546# Joint Publications Research Service, Arlington, Va.

INFLUENCE OF LASER HARDENING ON MECHANICAL PROPERTIES OF TYPE 45 STEEL Abstract Only c26

V. S. Velikikh, V. P. Goncharenko, A. V. Romanenko, and V. F. Terentyev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 13-14 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 21-25 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

Laser hardening can increase the hardness and wear resistance

of the surface layer of tool and structural steels. The influence of laser hardening on the mechanical properties of type 45 steel in tensile testing is investigated. The specimens are heat treated before testing by normalization, quenching from 830 C through water into oil with subsequent tempering at 520 C. Pulsed laser hardening is performed in air with a laser pulse energy of 90 J, spot diameter 7 mm, pulse length 8 ms. This created a laser hardened layer 120 mm in depth. Specimens are tempered after laser hardening at 220 C and static tensile testing performed at a deformation rate of 2.5 mm per min with simultaneous recording of acoustical emission. Metallographic studies and microhardness measurements are also performed. Laser hardening causes deterioration of mechanical characteristics including tensile strength, yield point and ductility. Laser hardening with subsequent tempering improves yield point and tensile strength and can be used to improve the reliability of parts experiencing static/loads. M.A.C.

N84-34547# Joint Publications Research Service, Arlington, Va.
HIGH SPEED LASER FORMATION OF SMALL DIAMETER APERTURES IN PRINTED CIRCUIT BOARD BLANKS Abstract Only **c36**
F. I. Zhuk, O. S. Lysogorov, and N. I. Chetverikov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 14 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 16-20 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The formation process of small diameter apertures by the radiation of a CO2 laser in an epoxy based glass reinforced plastic used in the production of pc boards with layer thickness 0.15 mm is examined. The glass fraction of the substance has high infrared CO2 laser radiation absorption, improving the quality and effectiveness of laser drilling. Conditions of production of holes without metalization studied which met the requirements that laser drilling must be faster than mechanical drilling on two coordinate program controlled drilling machines (less than about 0.2 s). The focusing system for the laser beam was a two element lens designed for minimum aberration. Diagrams of hole shapes produced by various methods of operation are presented. The apertures formed by the laser pulses are well coated by chemical copper from solution and nickel from the gas phase, allowing them to be used as contact apertures in PC boards. M.A.C.

N84-34548# Joint Publications Research Service, Arlington, Va.
ESTIMATING TARGET TEMPERATURE IN LASER EXPERIMENTS IN NITROGEN AT HIGH PRESSURES Abstract Only **c36**
A. A. Uglov and Ye. M. Ivanov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 15 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 12-15 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Experiments are described in which a neodymium laser with a pulse length of about 1 ms was used. The time specifics of transmission of the laser radiation through the plasma cloud are noted. Numerical calculations are performed for a titanium target in nitrogen at high pressure. The results of calculation of excess target surface temperature show that the temperature curve has a maximum which shifts toward lower values of t with an increase in nitrogen pressure. After the temperature maximum is reached, the curve of temperature as a function of time changes little. The temperature drops slightly. There may be a second rising section of the temperature curve resulting from the increased significance of target heating due to plasma radiation. M.A.C.

N84-34549# Joint Publications Research Service, Arlington, Va.
FAILURE OF ALUMINUM ALLOY IN THE PRESPLITTING STAGE Abstract Only **c26**
V. I. Romanchenko *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 15-16 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 6, Jan. 1983 p 45-49 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

In order to expand information on the problem of splitting fracture caused by the interaction of shock waves in condensed media with free surfaces or division boundaries and seek a correlation between crack formation and the macroscopic properties of the material, results are presented from experiments on the study of presplitting fracture of high strength aluminum alloys. Targets consisting of aluminum alloy disks are impacted with an aluminum plate accelerated in a pneumatic powder installation, with a layer of soft standard material consisting of organic glass attached to the rear surface of the target. Oscillograms of the experiments at various impact speeds established that macroscopic separation of the aluminum alloy occurs at impact speeds of over 270 m/s. The energy remaining in the split layer during development of fracture is proportional to the surface of the crack or the square of its linear dimension. M.A.C.

N84-34550# Joint Publications Research Service, Arlington, Va.
PREDICTING FATIGUE DURABILITY OF DURALUMIN SPECIMENS Abstract Only **c39**
M. G. Petrov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 16 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 6, Jan. 1983 p 22-24 Original language doc. previously announced in IAA as A83-39499 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The plastic deformation and service life of smooth specimens of DIGAT under static and cyclic loads are analyzed on the basis of the molecular kinetic theory of fracture and deformation as thermally activated processes. Equations are obtained for fracture and strain rates and are used to plot fatigue curves for smooth specimens and to estimate the service life of structural specimens in the form of a strip with a central hole. Results of calculations are compared with experimental data. B.J.

N84-34551# Joint Publications Research Service, Arlington, Va.
FAR NORTH AS SOURCE OF NONFERROUS METALS **c43**
P. Lomako *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 17-20 Transl. into ENGLISH from Sots. Industriya (Moscow), 18 May 1983 p 2 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Several areas of the U.S.S.R. contain large deposits of nonferrous metals including nickel, cobalt, bauxite, platinum, and gold. However, complex mining and engineering efforts are required to meet the challenges of low temperatures, wind, and snow. It is recognized that the environment will stress human beings as well as machinery and instruments. Comfortable working conditions are seen as a measure to increase labor productivity, reduce occupational diseases and accidents, and alleviate the high personnel turnover rate. R.S.F.

N84-34552# Joint Publications Research Service, Arlington, Va.
USE OF CONCENTRATED SOLAR ENERGY TO FORM SLIP COATINGS Abstract Only **c44**
A. A. Korol, Ye. A. Korol, I. Ye. Kasich-Pilipenko, P. A. Verkhovodov, V. S. Dvernyakov, and V. Kh. Kadyrov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 21 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 39-42 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Melted slip coatings were obtained and the structural changes in the coatings and their substrates upon simultaneous heating by concentrated solar radiant energy fluxes were studied. Well known wear and corrosion resistant TiC-Ni-B and WC-Ni-B coatings 50 to 300 microns thick applied by the slip method to flat or cylindrical stainless steel and titanium specimens were examined. The specimens were heated in an SGU-5 solar heating installation with a 2 m diameter parabolic mirror concentrator in a process chamber with a quartz window under a vacuum. Metallographic analysis revealed a finely dispersed heterogeneous structure with no visible porosity, good bonding of coating to substrate, and

uniform distribution of carbide phase in the metal matrix of the TiC-Ni-B coatings on titanium. Results were similar for the other coatings, indicating that concentrated solar energy can produce coatings with satisfactory surface quality, good density, and a framework structure. The coating interacted with the substrate by diffusion. Most of the volume of the substrate underwent no significant changes, indicating good bond strength between coatings and substrate. Author

N84-34553# Joint Publications Research Service, Arlington, Va.
CORROSION PROTECTIVE PROPERTIES OF COATINGS OBTAINED BY HYDRAULIC PULSE COMPACTING OF ALUMINUM POWDER Abstract Only c26
V. N. Polyakov, M. N. Lobashev, and V. B. Yakovlev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 21-22 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 36-68 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The electrochemical and protective properties of an hydraulic pulse aluminum coating were studied: pure aluminum in solutions of NaCl and H S was examined for comparison. Polarization curves were measured from steady potential into the anode and cathode areas. Results show that the fine grained structure of hydraulic pulse aluminum coatings under high loads (near the ultimate strength) has the capability of significant plastic deformation. Rotation of grains at normal loading speeds and temperatures is explicable by a mechanism of slipping between grains. The grain boundaries apparently absorb dislocations located near the grains, leading to relaxation of the loads applied. The hydraulic pulse aluminum coating has the following advantages over other aluminum coatings: fine grain, good ductility, low corrosion rates in many solutions, no brittle intermetallides, and good resistance to corrosion under stress in hydrogen and sulfur containing materials. Coatings can be applied to parts of any shape without annealing and without changing the mechanical properties of the base material. Shortcomings include the need for a special explosive installation for application. Author

N84-34554# Joint Publications Research Service, Arlington, Va.
HYDROGEN EMBRITTLEMENT OF TITANIUM AND ITS ALLOYS Abstract Only c26
B. A. Kolachev and V. D. Talalyev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 23 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 3, May - Jun. 1983 p 87-92 Original language doc. previously announced in IAA as A83-36884 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The main results of experimental and theoretical research on the hydrogen embrittlement of titanium and its alloys carried out by various workers over a period of more than three decades are summarized. In particular, it is shown that the susceptibility of titanium and its alloys to hydrogen mbrittlement can be effectively estimated from impact toughness and fracture toughness test data as well as data on the delayed fracture and cracking in liquid and gaseous hydrogen. It is also shown that vacuum annealing of titanium structures is the principle way of preventing the hydrogenation of titanium alloys. The principles governing the selection of vacuum annealing schedules are examined. V.L.

N84-34555# Joint Publications Research Service, Arlington, Va.
ELECTROCHEMICAL BEHAVIOR OF AMORPHOUS TITANIUM-BASED ALLOY AFTER VARIOUS ANNEALING CONDITIONS Abstract Only c26
N. D. Tomashov, I. B. Skvortsova, P. B. Budberg, V. V. Molokanov, and S. P. Alisova *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 24 Transl. into ENGLISH from Zashchita Metallov (Moscow), v. 19, no. 3, May - Jun. 1983 p 398-400 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

A eutectic alloy of Ti-Ti2Ni-Ti2-Cu-Ti5Si3 with the following composition was studied: Ti 66.1%, Ni 21.2%, Cu 9.75%, and Si 3.95%. The crystallization temperature was 540 C. In addition to X-ray structural determinations, the electrochemical behavior of the alloy was studied in the crystalline and amorphous states without annealing and after annealing of the amorphous alloy according to three conditions. The conditions were: 360 deg, 15 minutes; 360 deg, 10 hours; and 420 deg, 100 hours. Experiments were performed on a strip 38 micron thick and 5.5 mm wide obtained by cooling the melt at about 105 C/sec on a cylindrical rapidly rotating copper surface. The results of the study indicate that the electrochemical characteristics of amorphous alloys are quite sensitive to structural changes occurring in these materials as they are heated. In addition to other physical methods such as differential-thermal, resistometric, and dilatometric methods, the electrochemical characteristics can be successfully used to evaluate the general thermal stability of the amorphous state, particularly to record the very initial stages of breakdown of the amorphous state. R.S.F.

N84-34556# Joint Publications Research Service, Arlington, Va.
GENERATION OF REACTIVE STRESSES IN TINI ALLOY Abstract Only c26
V. A. Likhachev, M. V. Masterova, A. N. Marshalkin, and I. Yu. Makarov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 25 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 4, Apr. 1983 p 72-74 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The portion of deformation arising under increasing stress conditions which is converted to plastic deformation of the austenitic phase was studied. Concurrently, the portion of deformation extended in heating for relaxation effects during the martensite-austenite reaction or in the martensitic state in alloys with reversible martensitic transformation was examined. Tin-nickel alloys of equiatomic composition with martensitic conversion temperatures M sub S = 270K, M sub F = 200K, A sub S = 300K and A sub F = 370K were investigated. A twisting machine was used to avoid the secondary influence of thermal expansion and phase conversion dilation. Results show that under conditions under which reactive stresses occur, deformation of shape memory is expended primarily in plastic deformation of the austenitic phase, the loss being as if the reactive stresses developing were related exclusively to isothermic loadin of austenite. The physical basis for this distribution of work is not determined. R.S.F.

N84-34557# Joint Publications Research Service, Arlington, Va.
RELATIONSHIP OF STRUCTURE WITH CYCLIC CRACK RESISTANCE OF ALPHA-TITANIUM ALLOYS Abstract Only c26
A. G. Bochvar, V. F. Terentyev, and I. S. Kogan *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 26-27 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 3, May - Jun. 1983 p 146-149 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01 .

The influence of structure on the kinetics of fatigue failure of titanium alloys was studied. Sheets of type VTI-O technical titanium and OT4-1 titanium lloy 0.5 to 0.7 mm thick produced by the standard technology under plant conditions were examined. Some of the specimens were subjected to annealing at 970 C in a vacuum. The fatigue properties were studied both on smooth specimens and specimens with stress concentrators. Mechanical properties were determind on an Instron TT-DM at 20 to 25 C. Optical and scanning electron microscope studies of fracture surfaces were performed. The limited durability of flat specimens with a notch was greater in annealed structures, while that of smooth specimens was greater as delivered. Alloyed titanium is more durable than technical titanium. There is a great differences in the mechanisms of propagation of fatigue cracks as a function of structural state. For fine grained material with globular structure, crack growth shows viscous fracture in all stages. In large grained material with plate-like structure, there is mixed brittle and viscous fracture. R.S.F.

N84-34558# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF INITIAL MICROSTRUCTURES OF OT4-1 ALLOY ELEMENTS JOINED BY DIFFUSION WELDING Abstract Only **c37**
V. V. Peshkov and A. O. Kudashov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 28 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 5, May 1983 p 26-27 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

A study is made of the possibility of increasing tensile strength where the ratio of filler thickness to shell thickness of a composite is over 0.35 for load-bearing composite shells with a honeycomb filler. Two means of increasing quality of such diffusion welded structures are suggested: the use of shells of a material with equiaxial fine grained microstructure and a structurally heterogeneous filler with course grained microstructure in the volume and equiaxial fine grained structure in the surface layer, which participates in the formation of the welded joint; and the use of a shell of a material with course grained plate structure, a filler of the same structure as in case 1. The former method is found to be more effective. A structurally heterogeneous filter can be obtained by preliminary treatment of blanks with an oscillating unfocused electron beam. R.J.F.

N84-34559# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF CONDITIONS AND MEDIUM OF ANNEALING ON SHORT-TERM STRENGTH AND FATIGUE RESISTANCE OF WELDED JOINTS IN OT4 TITANIUM ALLOY Abstract Only **c26**
I. I. Muravyev, A. B. Kolomenskiy, B. A. Kolachev, and V. V. Shevchenko *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 28-29 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 5, May 1983 p 21-25 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The characteristics of fatigue resistance of welded joints in OT4 alloy after complete annealing in air and at low pressure are compared, and certain factors leading to a change in the endurance limit of joints are analyzed. The first stage involved experimental testing of welded joints after various versions of incomplete annealing. The endurance of welded joints annealed at low pressure and 550 C, 2 hours was found to be no higher than that of joints annealed in air under the same conditions. When annealed at atmospheric pressure 500 C, 2 hours and 550 C, 1 hour, endurance was higher. The differing effects of incomplete annealing in terms of fatigue resistance of joints can probably be explained not only by the varying degree of surface gas saturation, but also by structural changes. A decrease in fatigue resistance after annealing 2 hours in air at up to 500 C and 1 hour at up to 550 C apparently results from an increase in the thickness of the brittle oxide film. Where there are no rigid limitations in terms of residual welding stresses, it is desirable to anneal in air at 450 to 500 C, 2 hours in order to increase strength and fatigue resistance. R.J.F.

N84-34560# Joint Publications Research Service, Arlington, Va.
STUDY OF SPECIFICS OF FORMATION OF STRESS AND STRAIN IN MAKING CIRCULAR WELDED JOINTS IN ALUMINUM ALLOY ENVELOPES Abstract Only **c39**
L. M. Lobanov, V. I. Pavlovskiy, and B. S. Kasatkin *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 30 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 4, Apr. 1983 p 1-10 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

A study is presented of the influence of preliminary elastic flexure of a spherical shell on deformation kinetics of shaped change, distribution of plastic shortening deformation and residual stress in the zone of thermal influence of a circular welded joint. The experiments were performed on circular elements of spherical shells with a radius of curvature R=80 mm and thickness H=6.7 mm to which flanges 300 mm in diameter were welded in a single pass. The deformation kinetics were significantly different in shell and flange, even though the maximum heating temperatures of the points studied on the shell and the flange were identical (550 K). Preliminary elastic flexure creating circular stress in the shell decreases elastic-plastic deformation upon welding. The residual stress state features slight membrane and great bending components, particularly in the meridional direction. Preliminary elastic flexure can compensate for welding displacement of the shell and thus reduce residual stresses by 15 to 20%. R.J.F.

N84-34561# Joint Publications Research Service, Arlington, Va.
COMPARATIVE ESTIMATE OF CYCLIC STRENGTH OF WELDED JOINTS IN TITANIUM ALLOYS Abstract Only **c39**
A. G. Grigoryants, Yu. B. Florinskiy, V. F. Moryakov, and Yu. N. Kvasha *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 30-31 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 4, Apr. 1983 p 16-18 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Results are presented from a comparative estimate of the cyclic strength of joints in PT-3V titanium alloy made by three welding methods: argon-arc welding, electron-beam welding and laser welding. Optimal conditions were selected, assuring through melting of the 250 x 40 x 5 mm plates and eliminating visible defects. Specimens were tested by alternating flexure at room temperature, the specimen oscillating at resonance. An electromagnetic was used to impart additional oscillation to the beam carring the specimen. The oscillating frequency, 100 Hz, imitated conditions under which the products made of these alloys would be used. It was found that the lasr welded specimen had superior mechanical properties, primarily as a result of increased dispersion of seam and near-seam zone metal and more compact placement of a phase plates, which are dislocation barriers. R.J.F.

N84-34562# Joint Publications Research Service, Arlington, Va.
EXPLOSIVE WELDING IN THE MANUFACTURE OF TITANIUM SHELLS Abstract Only **c37**
O. A. Denyachenko and V. I. Romaniv *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 33 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 5, May 1983 p 9-10 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The capabilities of explosive welding are demonstrated by the example of the manufacturing of titanium shells from sheet rolled products. The method is based on a combined method of producing a joint, including welding by melting and explosive welding. A longitudinal butt seam is preliminary rolled and welded by argon arc welding by the usual technology. The outer surface in the area of the seam is then ground to a certain depth over the entire length to produce a flat area on which a sheet titanium plate is welded explosively. The ordinary parallel system widely used to produce flat joints is used. Photomicrographs of the surface are presented. Comprehensive analysis of the data obtained indicated the optimal welding conditions, yielding no division boundary in the welded joints and a strength of about 650 MPa. This ideal technology is not specifically described. R.J.F.

N84-34563# Joint Publications Research Service, Arlington, Va.
DISCUSSION OF SUPERPLASTICITY EFFECT **c26**
A. Tikhonov and A. Bazyk *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 34-37 Transl. into ENGLISH from Pravda (Moscow), 28 Apr. 1983 p 3 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The replacement in machine building of production processes based on the cutting of metals with economical shaping methods is discussed. The working of metals with pressure makes it possible to reduce the amount of material wasted during the production process. The capabilities of this technology, and the prospects for it are examined. R.J.F.

N84-34564# Joint Publications Research Service, Arlington, Va.
IMPROVING THE DESIGN OF MULTILAYER PIPES **c31**
In its USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 38-46 Transl. into ENGLISH from Stroitelstvo

Truboprovodov (Moscow), no. 4, Apr. 1982 p 21-24 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Production of multilayer steel pipe for gas pipelines up to 1420 mm in diameter, designed for pressures of 10 to 12 MPa, is discussed. The multilayer wall structure, when properly designed, assures high reliability of pipes, primarily due to the reduced danger of sudden failure. However, multiple layers give these pipes certain special properties which under certain conditions may have a negative influence on their performance. Special design decisions are required to limit these negative influences. The possibility of a leak in the inner layer must be considered. In this case the gas penetrates into the gap between the first and second (counting from the inside) layers of the shell. The pressure in the gap becomes as great as the pressure in the pipe and the first layer is no longer functional, resulting in an overload on all subsequent layers. This process is accompanied by gradual elevation in stress. To prevent these problems, several perforations must be made in each shell, passing through all layers except the innermost layer. R.J.F.

N84-34565# Joint Publications Research Service, Arlington, Va.
STUDY OF SUPERFINE INTERACTIONS IN AMORPHOUS CHROMIUM-CONTAINING ALLOYS BY MOSSBAUER SPECTROSCOPY Abstract Only c26
G. N. Belozerskiy, V. G. Semenov, and S. A. Chekashova *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 48 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 55, no. 5, May 1983 p 923-930 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Iron and chromium based alloys which are used for their anticorrosion properties were studied. The following alloys were investigated: FeCr10B13C7, FeCr10P13C7, FeCr10Mo2P13C7. The magnetic properties and magnetic heterogeneity of the alloys were analyzed. The effective magnetic fields and distributions of values of Heff in the volume and on the surface of the strips were examined. The alloy FeB14, was subjected to Mossbauer spectroscopy. It is found that the alloys have slight magnetic heterogeneity. The degree of magnetic heterogeneity is significantly less than in iron-nickel based alloys. The addition of just 2% Mo to an alloy containing phosphorus greatly changes the electron properties. Comparison of the magnetic properties of the surface and volume of the specimens shows significant differences for the alloy which contain molybdenum. The internal stresses in the specimen lead to preferential orientation of agnetic moments of iron atoms in the plane of the strip. E.A.K.

N84-34566# Joint Publications Research Service, Arlington, Va.
ANODIC DISSOLUTION OF TRANSITION METAL CARBIDES AT HIGH CURRENT DENSITY Abstract Only c26
N. A. Amirkhanova, L. G. Rafikova, and O. N. Tatarinova *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 49-50 Transl. into ENGLISH Zashchita Metallov (Moscow), v. 19, no. 3, May - Jun. 1983 p 412-414 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The anodic behavior of chromium carbides molybdenum, titanium and zirconium at high current density in high alloy aviation alloys as dispersion hardening additives were studied. Specimens of compact hot pressed carbides were manufactured as cylinders, lateral ces were covered with epoxy compound. Polarization was conducted in a potentiodynamic state and under galvanostatic conditions. The shape of the polarization curves in the chloride solution and in sodium nitrate differed when chromium carbide was ionized in a solution of both sodium chloride and sodium nitrate. The chromium goes over into the solution in two stages of oxidation, Cr (III) and Cr (IV). The partial yields of metallic components of the carbides show that the nature of the electrolyte has a significant influence on ionization of the metal component. E.A.K.

N84-34567# Joint Publications Research Service, Arlington, Va.
PRODUCTION METHODS AND PROPERTIES OF METAL POWDERS FOR HIGH TEMPERATURE PRESSING Abstract Only c26
G. A. Krivonos, V. M. Blekherov, and V. G. Golubkov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 50 Transl. into ENGLISH from Kuznechno-Shtampovochnoye Proizv. (Moscow), no. 5, May 1983 p 20-22 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Production alloy spraying is a method for high quality steel and alloy powders. Production of powders by spraying is based on breakup of a melt into dispersed droplets. The fractional composition of the powder and productivity of the process are determined by the thermophysical properties of the material, power of the heat source, rate of spinning and diameter of the metal being melted. The produced powders are usually spherical without internal porosity or surface defects. The main methods of powder working are hot isostatic pressing, extrusion and their combinations. Another method of powder production is dispersion of a jet of metal by a high pressure jet of water flowing from a sprayer. This method is used for the production of iron, low carbon and low alloy steel, and stainless steel and alloy powders. Gas jet spraying of melts uses simple apparatus and is low in cost. Diagrams of some powder production methods are presented. E.A.K.

N84-34568# Joint Publications Research Service, Arlington, Va.
CREEP OF LaCrO-3Cr CERAMIC-METALLIC MATERIAL Abstract Only c27
S. M. Barinov, V. S. Bakunov, V. S. Ivanov, Yu. L. Krasulin, and E. G. Spiridonov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 51 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 137-138 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The creep of cermets in the system LaCrO3-Cr which was obtained by static and high speed pressing were compared. Materials with continuous interpenetrating ceramic and metallic framework were studied. It is shown that the creep rate is controlled by diffusion processes at the lanthanum chromite grain boundaries. The cermets produced by high speed pressing creeps more rapidly as a result of grain breakup, the formation of a substructure and nonequilibrium defect concentration. The use of high speed pressing to produce materials with increased stress relaxation capacity is recommended. E.A.K.

N84-34569# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF BOUNDARY VOLUME STRUCTURE ON GRAIN BOUNDARY RELAXATION OF CAST HEAT RESISTANT NICKEL ALLOYS Abstract Only c26
A. S. Nagin and V. N. Gadalov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 51 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 106-110 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

Methods of internal friction were used to estimate the influence of eutectic interlayers on certain characteristics of heat resistant cast nickel alloys. Grain boundary internal friction was studied for six different alloys. It was found that grain boundary relaxation parameters are influenced by the degree of alloying, structure and phase composition of alloys. The height of the grain boundary peak representing the degree of attachment of grain boundaries decreased with an increase in the dispersion of carbide phases in the spaces between dendrites and grains, as well as the primary intermetallide Ni3(Al, Ti) type gamma phase and other phases in the alloys. The stability of the alloys, increased with increasing molybdenum and tungsten content in the alloys. E.A.K.

N84-34570# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF NITROGEN-HYDROGEN-CONTAINING MEDIA ON HEAT RESISTANCE PROPERTIES OF NICKEL-BASED ALLOYS Abstract Only c26

A. L. Bichuya, Yu. D. Nikiforov, and Ye. P. Arskara *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 52 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 4, Apr. 1983 p 98-101 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

The kinetics of the corrosion process and the influence of ammonia decomposition products on the mechanical properties of various metal structural materials was studied. The formation of carbohydride and nitrohydride compounds indicates that the interaction of hydrogen with nitrides and carbides at normal pressure is possible, increasing with higher temperatures. The effect of the medium is seen at high stresses. At low stresses the hydrogen penetrating the metal and leading to strength loss is not concentrated in local microscopic volumes but rather dissolved uniformly throughout the entire volume, which eliminates the strength reducing effect. E.A.K.

24 COMPOSITE MATERIALS

Includes laminates.

N84-34571* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS FOR IMPROVING MECHANICAL PROPERTIES OF EPOXY RESINS BY ADDITION OF COBALT IONS Patent
Diane M. Stoakley and Anne K. St.Clair, inventors (to NASA) Issued 25 Sep. 1984 8 p Filed 03 Nov. 1983 Supersedes N84-20701 (11 - 20, p 1637)
(NASA-Case-LAR-13230-1; NAS 1.71:LAR-13230-1; US-Patent-4,473,674; US-Patent-Appl-SN-548584; US-Patent-Class-523-454; US-Patent-Class-523-458; US-Patent-Class-525-484; US-Patent-Class-528-92; US-Patent-Class-528-407) Avail: US Patent and Trademark Office CSCL 11D

A resin product useful as an adhesive, composite or casting resin is described as well as the process used in its preparation to improve its flexural strength mechanical property characteristics. Improved flexural strength is attained with little or no change in density, thermal stability or moisture resistance by chemically incorporating 1.2% to 10.6% by weight Co(3) ions in an epoxidized resin system.
Official Gazette of the U.S. Patent and Trademark Office

N84-34572# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
PREDICTION OF CRACK EXTENSION DIRECTION IN UNIDIRECTIONAL COMPOSITES
M. A. Gregory and C. T. Herakovich Aug. 1984 133 p refs Prepared for Hercules, Inc., Magna, Utah
(VPI-E-84-27; CCMS-84-11) Avail: NTIS HC A07/MF A01

The purpose of this study was to gain a better understanding of the parameters affecting crack growth direction in unidirectional composite materials. To achieve this, the effect of anisotropy and biaxial loading on the direction of crack growth in unidirectional off-axis composite materials were investigated. Specific emphasis was placed on defining the crack tip stress field and finding a consistent criterion for predicting the direction of crack growth. Two models are presented to predict the crack tip stress field, an anisotropic elasticity solution and a singular isoparametric finite element formulation. After defining the crack tip stress field, three crack extension direction criteria, the normal stress ratio, the tensor polynomial and the strain energy density criterion, were applied to predict the direction of crack extension. The theoretically predicted crack extension directions were then compared with experimental results. After comparison, it was determined that only the normal stress ratio criterion correctly predicts the direction of crack extension. Author

N84-34573*# Douglas Aircraft Co., Inc., Long Beach, Calif.
ADVANCED COMPOSITE VERTICAL STABILIZER FOR DC-10 TRANSPORT AIRCRAFT Quarterly Technical Progress Report, 27 Mar. - 25 Jun. 1978
C. O. Stephens 26 Jul. 1978 99 p refs
(Contract NAS1-14869)
(NASA-CR-173985; NAS 1.26:173985; ACEE-03-PR-8484; QTPR-5) Avail: NTIS HC A05/MF A01 CSCL 11D

The structural design configuration for the Composite Vertical Stabilizer is described and the structural design, analysis, and weight activities are presented. The status of fabrication and test activities for the development test portion of the program is described. Test results are presented for the skin panels, spar web, spar cap to cover, and laminate properties specimens. Engineering drawings of vertification test panels and root fittings, rudder support specimens, titanium fittings, and rear spar specimen analysis models are included. B.W.

N84-34574*# National Aeronautics and Space Administration, Washington, D. C.
SILICON CARBIDE MATERIAL SINTERED BODIES MANUFACTURING
Keiichiro Suzuki and Nobuhiro Shinohara Aug. 1984 12 p Transl. into ENGLISH of Japanese Patent no. 58-91071 (Appl. no. 56-189254, 27 Nov. 1981) p 379-383 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77596; NAS 1.15:77596) Avail: NTIS HC A02/MF A01 CSCL 11D

A method is described for producing a high density silicon carbide sintering substance which contains aluminum oxide. The sintering is done in CO gas atmosphere, which is kept at 2 to 20 atmospheric pressures. Author

N84-34575*# Case Western Reserve Univ., Cleveland, Ohio.
MECHANICAL BEHAVIOR OF CARBON-CARBON COMPOSITES Final Report
Gary A. Rozak Sep. 1984 31 p refs
(Grant NAG3-464)
(NASA-CR-174767; NAS 1.26:174767) Avail: NTIS HC A03/MF A01 CSCL 11D

A general background, test plan, and some results of preliminary examinations of a carbon-carbon composite material are presented with emphasis on mechanical testing and inspection techniques. Experience with testing and evaluation was gained through tests of a low modulus carbon-carbon material, K-Karb C. The properties examined are the density - 1.55 g/cc; four point flexure strength in the warp - 137 MPa (19,800 psi) and the fill - 95.1 MPa (13,800 psi,) directions; and the warp interlaminar shear strength - 14.5 MPa (2100 psi). Radiographic evaluation revealed thickness variations and the thinner areas of the composite were scrapped. The ultrasonic C-scan showed attenuation variations, but these did not correspond to any of the physical and mechanical properties measured. Based on these initial tests and a survey of the literature, a plan has been devised to examine the effect of stress on the oxidation behavior, and the strength degradation of coated carbon-carbon composites. This plan will focus on static fatigue tests in the four point flexure mode in an elevated temperature, oxidizing environment. Author

N84-34576*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FRACTURE MODES IN NOTCHED ANGLEPLIED COMPOSITE LAMINATES
Thomas B. Irvine and Carol A. Ginty 1984 27 p refs Presented at Symp. on Composite Fatigue and Fracture, Dallas, 24-25 Oct. 1984; sponsored by American Society for Testing and Materials (NASA-TM-83802; E-2307; NAS 1.15:83802) Avail: NTIS HC A03/MF A01 CSCL 11D

The Composite Durability Structural Analysis (CODSTRAN) computer code is used to determine composite fracture. Fracture modes in solid and notched, unidirectional and angleplied graphite/epoxy composites were determined by using CODSTRAN. Experimental verification included both nondestructive (ultrasonic C-Scanning) and destructive (scanning electron microscopy)

techniques. The fracture modes were found to be a function of ply orientations and whether the composite is notched or unnotched. Delaminations caused by stress concentrations around notch tips were also determined. Results indicate that the composite mechanics, structural analysis, laminate analysis, and fracture criteria modules embedded in CODSTRAN are valid for determining composite fracture modes. R.J.F.

N84-34577*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GROUND EXPOSURE OF COMPOSITE MATERIALS FOR HELICOPTERS
Donald J. Baker Oct. 1984 9 p refs Presented at the AHS Natl. Spec. Meeting-Helicopter Testing Technol., 29 Oct. - 1 Nov. 1984, Williamsburg, Va.
(NASA-TM-86311; AVSCOM-TM-84-B-2; NAS 1.15:86311) Avail: NTIS HC A02/MF A01 CSCL 11D

Residual strength results are presented on four composite material systems that were exposed for three years at locations on the North American Continent. The exposure locations are near the areas where Bell Model 206L Helicopters, that are in a NSA/U.S. Army sponsored flight service program, are flying in daily commercial service. The composite systems are: (1) Kevlar-49 fabric/F-185 epoxy; (2) Kevlar-49 fabric/LRF-277 epoxy; (3) Kevlar-49 fabric/CE-306 epoxy; and (4) T-300 Graphite/E-788 epoxy. All material systems exhibited good strength retention in compression and short beam shear. The Kevlar-49/LRF-277 epoxy rotained 88 to 93 percent of the baseline strength while the other material systems exceeded 95 percent of baseline strength. Residual tensile strength of all materials did not show a significant reduction. The available moisture absorption data is also presented. Author

N84-34578# Army Armament Research and Development Command, Dover, N. J. Fire Control and Small Caliber Weapon Systems Lab.
INTRODUCTION TO COMPOSITE MATERIALS
Y. S. Shin Aug. 1984 56 p
(AD-A144274; AD-E401216; ARSCD-TR-83016) Avail: NTIS HC A04/MF A01 CSCL 11/4

Advanced composite materials are light, stiff, and extremely strong, but suffer poor transverse strength and high price. Additional requirements for strength at elevated temperatures and stability under severe environmental conditions are satisfied by increasing use of metal matrix materials. Two ways to increase the composite strength is by the use of larger diameter filaments and by heat treating aluminum alloy matrix. Advanced composites are used mainly as panels or structural members in space vehicles or aircraft; a lot of new development work is required before composites can be used for machined parts. Subjects covered in this report are general information on reinforcements, interface and bonding, micromechanics, consolidation process, mechanical properties of composite materials, improved mechanical properties, and applications. GRA

N84-34514# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF STRESS-DEFORMED STATE OF THREE-LAYER SHELLS MADE WITH ANISOTROPIC HIGH-MODULE COMPOSITE MATERIALS Abstract Only
V. U. Kotelnikov, S. V. Mokryy, I. A. Sergeyev, A. A. Chernov, and G. I. Yurin *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 6-7 Transl. into ENGLISH from Mekh. Kompozitnykh Materialov (Riga), no. 4, Jul. - Aug. 1983 p 642-647 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34516# Joint Publications Research Service, Arlington, Va.
FRACTURE TOUGHNESS OF CRYSTALLINE AND COMPOSITE SUPERHARD MATERIALS Abstract Only
N. V. Novikov and A. L. Maystrenko *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 8 Transl. into ENGLISH from Fiz.-Khim. Mekh. Materialov (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 46-53 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34517# Joint Publications Research Service, Arlington, Va.
SEIZING IN FRICTION OF COMPOSITE MATERIALS WITH DIFFERING PHASE COMPOSITIONS Abstract Only
V. P. Bondarenko *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 9 Transl. into ENGLISH from Sverkhtverdyye Materialy (Kiev), no. 4, Jul. - Aug. 1983 p 19-27 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34536# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF NATURAL EXPOSURE IN SPACE ON PHYSICAL-MECHANICAL PROPERTIES OF CARBON REINFORCED PLASTIC Abstract Only
G. M. Gunyayev, M. I. Dushin, Yu. N. Ivonin, L. A. Kvacheva, V. V. Mikhaylov, Ye. F. Nikishin, and O. V. Startsev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 5 Transl. into ENGLISH from Mekhan. Kompozitnykh Materialov (Riga), no. 2, Mar. - Apr. 1983 p 211-215 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34537# Joint Publications Research Service, Arlington, Va.
COMPOSITE MATERIALS WITH ALUMINUM MATRIX REINFORCED WITH CARBON FIBERS Abstract Only
A. A. Zabolotskiy, V. Ya. Varshavskiy, T. D. Karimbayev, and V. I. Pavlov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 6 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 59-64 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34538# Joint Publications Research Service, Arlington, Va.
HIGHLY POROUS POWDER-FIBER COMPOSITE MATERIALS Abstract Only
A. G. Kostornov, N. Ye. Fedorova, and L. I. Chernyshev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 6 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 53-56 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34539# Joint Publications Research Service, Arlington, Va.
FRACTURE MECHANISM OF CARBON AND BORON REINFORCED PLASTICS WITH SHEAR BETWEEN LAYERS Abstract Only
L. P. Kobets, V. V. Mikhaylov, and O. N. Nadezhina *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 7 Transl. into ENGLISH from Mekhan. Kompozitnykh Materialov (Riga), no. 2, Mar. - Apr. 1983 p 251-256 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34540# Joint Publications Research Service, Arlington, Va.
PLANNING OF PLATES REINFORCED WITH EQUALLY STRESSED FIBERS OF CONSTANT CROSS SECTION Abstract Only
S. B. Bushmanov and Yu. V. Menirovskiy *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 7 Transl. into ENGLISH from Mekhan. Kompozitnykh Materialov (Riga), no. 2, Mar. - Apr. 1983 p 278-284 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-35056# Feng Chia Univ., Taichung (Taiwan).
ELASTIC WAVE PROPAGATION IN A PERIODICALLY TRILAMINATED COMPOSITE Abstract Only
Ti-Chiang Lee *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 484 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35057# National Chung Hsing Univ., Taichung (Taiwan).
BOUNDARY LAYER THERMAL STRESSES IN CROSS-PLY COMPOSITE LAMINATES Abstract Only
Chien-Chang Lin *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 484 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35058# National Taiwan Univ., Taipei.
EFFECT OF STACKING SEQUENCE ON FATIGUE LIFE OF COMPOSITE MATERIALS Abstract Only
Yuan-Fang Chou and Hsiang Chin *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 485 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N84-34579# British Library Lending Div., Boston Spa (England).
CONTRIBUTIONS TOWARDS ANALYTICAL CHROMATOGRAPHY
K. Teichert, E. Mutschler, and H. Rochelmeyer 6 Jul. 1984 7 p Transl. into ENGLISH from Deut. Apothener-Zeitung (West Germany), no. 11, 17 Mar. 1960 p 283-286
(BLL-M-29666-(5828.4)) Avail: British Library Lending Div.

The uses of plate chromatography are examined. Neutral and buffered silicagel plates are used to separate adrenalin/noradrenalin, amines, and purines. The separation of ergot alkaloids on formamide impregnated cellulose powder plates, and that of amino acids and amines on non-impregnated cellulose powder plates is discussed. M.A.C.

N84-34580# New York Univ., New York. Dept. of Chemistry.
SOLVATION AND DIELECTRIC DISPERSION IN OPTICAL ELECTRON TRANSFER
P. Delahay and A. Dziedzic Jul. 1984 30 p
(Contract N00014-82-K-0113)
(AD-A144183; NYU/DC/TR-6-New-Ser-2) Avail: NTIS HC A03/MF A01 CSCL 07/5

The effect of dielectric dispersion of the solvent on the energetics of optical electron transfer is determined quantitatively by variations of the free energy of solvation of the species being photoionized. The solvation free energy varies because the solvent polarizability in the inner-sphere region of the photon absorbing species changes with photon energy on account of dispersion. The solvation free energy is computed for a varying polarizability of the solvent in the inner-sphere region and a fixed nuclear configuration of the solvent. The change of solvation free energy in aqueous solution is computed in the 7 to 11 eV range from data on the refractive index of water obtained by reflectance spectroscopy. The theory accounts quantitatively for the effect of dispersion on photoelectron emission by aqueous solutions of anions, cations and molecules. GRA

N84-34581# Kentucky Univ., Lexington.
THE BROMINATION OF PYRAZABOLE Interim Technical Report
E. Hanecker, T. G. Hodgkins, K. Niedenzu, and H. Noeth 30 Jul. 1984 23 p
(Contract N00014-83-K-0611)
(AD-A144264; AD-E401208; UK/DC/TR-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

The stepwise B-bromination of pyrazabole with either BBr3 or Br2 has been studied. Both 4-monobromo- and 4,8-dibromopyrazabole have been isolated and characterized. The former is a thermally unstable species, the latter is formed as a mixture of cis and trans isomers. 4,4,8-Tribromopyrazabole could not be obtained in pure state but exists in mixture with the dibromo and tetrabromo derivative. The X-ray crystal and molecular structures of pyrazabole and 4,4,8,8-tetrabromopyrazabole have been determined. GRA

N84-34582# Naval Research Lab., Washington, D. C.
THEORY OF VORTICITY GENERATION BY SHOCK WAVE AND FLAME INTERACTIONS
J. M. Picone, E. S. Oran, J. P. Boris, and T. R. Young, Jr. 5 Jul. 1984 31 p
(AD-A144432; NRL-MR-5366) Avail: NTIS HC A03/MF A01 CSCL 21/2

We present detailed numerical and theoretical studies of vorticity generation by the interaction of a weak planar shock with an azimuthally symmetric flame. The calculations are two-dimensional and correspond to a cylindrical flame. To analyze the fluid-dynamic aspects of the problem, we exclude chemical reactions and model the flame as a region of reduced density and elevated temperature. We find that the rotational flows associated with the vorticity distribution are long-lived and can produce a significant distortion of the heated region. The results of our numerical simulations and the estimates of the nonlinear theory are quite consistent. We also compare the nonreactive numerical simulations with the experimental data of Markstein on shock wave and flame interactions in a stoichiometric mixture of n-butane and air. The numerical simulations reproduce most of the major experimental observations. We show that conventional Rayleigh-Taylor instability theory, which assumes a very small initial perturbation, does not provide a viable description of vorticity generation in Markstein's experiment. Instead, a nonlinear treatment based on the finite misalignment and finite interaction time of the pressure gradient associated with the shock and the density gradient of the flame is necessary. The effects of chemical reactions are also clarified through the comparison of numerical simulation and experiment. GRA

N84-34583# Princeton Combustion Research Labs., Inc., N.J.
ANALYSIS OF COMBUSTION OSCILLATIONS IN HETEROGENEOUS SYSTEMS Final Report, 15 Mar. 1982 - 14 Mar. 1983
M. Ben-Reuven and M. Summerfield Nov. 1983 61 p
(Contract F49620-82-C-0062)
(AD-A144436; PCRL-FR-83-005; AFOSR-84-0700TR) Avail: NTIS HC A04/MF A01 CSCL 21/2

This analysis is aimed at the near-wall processes in an injected, axisymmetric, viscous flow. It is a part of an overall study of solid propellant rocket instability, in which cold flow simulation is evaluated as a tool to elucidate possible instability-driving mechanisms. One such prominent mechanism seems to be visco-acoustic coupling, as indicated by earlier detailed order of magnitude analysis. The major component of the overall study involves numerical simulation of the full set of coreflow equations of motion (nonsteady, axisymmetric) by a modified MacCormack integration technique. To clarify some of the physical interactions inherent in the various regimes of the flowfield, two (separate) singular perturbation analyses have been carried out. The head-end boundary regime, and the injected sidewall layer, both involve appreciable viscous dissipation, and hence are characterized by predominantly parabolic differential systems. The inverse square root of the injection Reynolds number serves as a small-perturbation quantity. GRA

N84-34584# IBM Research Lab., San Jose, Calif.
SPECTROSCOPY OF ADSORBATES BY TRANSIENT LASER CALORIMETRY
H. Coufal, T. J. Chuang, and F. Trager 10 Aug. 1984 8 p
(Contract N00014-81-C-0418)
(AD-A144473; TR-10) Avail: NTIS HC A02/MF A01 CSCL 20/13

The status of photothermal surface spectroscopy is reviewed. The importance of real time compensation techniques is underlined.

Most recent results demonstrating sensitivities of hundredths of a monolayer of adsorbate are reported. Author (GRA)

N84-34585# Texas A&M Univ., College Station. Dept. of Chemistry.
HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC STUDIES OF THE ION EXCHANGE SELECTIVITY OF NAFION
R. B. Moore, III, J. E. Wilkerson, and C. R. Martin 6 Aug. 1984 31 p
(Contract N00014-82-K-0612)
(AD-A144646) Avail: NTIS HC A03/MF A01 CSCL 07/4

Nafion films were coated on 5 micron octadecyl-derivatized silica. HPLC columns were packed with this film-modified ODS and the ion exchange selectivity of Nafion was studied. A homologous series of organic cations was used to probe the ion exchange properties of Nafion. These studies show that Nafion has remarkable affinity for hydrophobic cations. The logs of the ion exchange selectivity coefficients for the cations of the homologous series were found to increase in a linear fashion with the molecular weight of the cation. Author (GRA)

N84-34586# Department of Energy, Washington, D. C.
LIQUID SUSPENSIONS OF REVERSIBLE METAL HYBRIDES Patent Application
James J. Reilly, Edward W. Grohse, and Warren E. Winsche, inventors (to DOE) Filed 8 Dec. 1983 13 p
(Contract DE-AC02-76CH-00016)
(DE84-014358; US-Patent-Appl-SN-559558) Avail: NTIS HC A02/MF A01

The reversibility of the process M + x/2 H2 (YIELDS) MH sub x, where M is a metal hydride former that forms a hydride MH sub x in the presence of H2, generally used to store and recall H2, is found to proceed under a liquid, thereby to reduce contamination, provide better temperature control and provide in situ mobility of the reactants. Thus, a slurry of particles of a metal hydride former with an inert solvent is subjected to temperature and pressure controlled atmosphere containing H2, to store hydrogen (at high pressures) and to release (at low pressures) previously stored hydrogen. The direction of the flow of the H2 through the liquid is dependent upon the H2 pressure in the gas phase at a given temperature. When the former is above the equilibrium absorption pressure of the respective hydride the reaction proceeds to the right, i.e., the metal hydride is formed and hydrogen is stored in the solid particle. When the H2 pressure in the gas phase is below the equilibrium dissociation pressure of the respective hydride the reaction proceeds to the left, the metal hydride is decomposed and hydrogen is released into the gas phase. DOE

N84-34587# International Centre for Theoretical Physics, Trieste (Italy).
GROUND-STATE PROPERTIES AND OPTICAL EXCITATIONS OF A SOLVATED ELECTRON IN MOLTEN ALKALI HALIDES
E. Roman, G. Senatore, and M. P. Tosi Sep. 1983 17 p refs Prepared in cooperation with International School for Advanced Studies and Istituto di Fisica Teorica dell'Univ.
(DE84-701191; IC-83/157) Avail: NTIS HC A02/MF A01

Properties of solvated electrons at high dilution in four molten alkali halides are investigated theoretically. A selfconsistent evaluation of the bound ground state of the electron and of the surrounding liquid structure is compared with the results of NMR hyperfine shifts and magnetic susceptibility measurements. The absorption bands associated with Franck-Condon 1s yields 2p and 1s yields 3p transitions are calculated and compared with the available data of optical absorption, with special emphasis on the detailed analysis by Yuh and Nachtrieb for molten CsCl. An instability of the excited states against ionic relaxation and the origin of a finite lifetime for the ground state are also discussed. Finally, the perturbation induced by the solvated electron in the fundamental absorption of the molten salt is estimated. Author

N84-34588# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATION OF REACTIONS OF THE METHYLENE RADICAL BY MEANS OF A FAR INFRARED-LASER MAGNETIC RESONANCE (FIR-LMR) SPECTROMETER Thesis [UNTERSUCHUNG VON REAKTIONEN DES METHYLEN-RADIAKALS MIT HILFE EINES FIR-LMR-SPEKTROMETERS]
Thomas Boehland Mar. 1984 55 p refs In GERMAN
(MPIS-4/1984; ISSN-0436-1199) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,95

The reactions of CH2 with O2, H, O, C2H2, and C4H4 were investigated with a FIR-LMR spectrometer in order to determine directly the velocity constants. The reactions were investigated at room temperature in several isothermal flow systems in the pressure range between 1.6 and 4.0 mbar. Several CH2 sources were tested as to their suitability for kinetic investigations. For the study of the reactions, the microwave discharge in chains and the reaction CH2 + CH2CO yields C2H4 + CO in which no perturbing by products are formed, were used. The velocity constant results from the measured concentration-time profiles of CH2 in the presence and in the absence of a large surplus of the reactants. Author (ESA)

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N84-34589*# National Aeronautics and Space Administration. Lewis Research Center Cleveland, Ohio.
FUNDAMENTALS OF ALLOY SOLIDIFICATION APPLIED TO INDUSTRIAL PROCESSES
Washington Sep. 1984 185 p refs Conf. held in Cleveland, 12-13 Sep. 1984 Sponsored in part by Case Western Reserve Univ.
(NASA-CP-2337; E-2235; NAS 1.55:2337) Avail: NTIS HC A09/MF A01 CSCL 11F

Solidification processes and phenomena, segregation, porosity, gravity effects, fluid flow, undercooling, as well as processing of materials in the microgravity environment of space, now available on space shuttle flights were discussed. For individual titles, see N84-34590 through N84-34601.

N84-34590*# Harvard Univ., Cambridge, Mass.
THE UNDERCOOLING OF LIQUIDS
David Turnbull *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 11-14 (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

The formation by melt quenching of such metastable structures as glassy or microcrystalline solids and highly supersaturated solutions is made possible by the extreme resistance of most melts to homophase crystal nucleation at deep undercooling. This nucleation resistance contrasts sharply with the very low kinetic resistance to the movement of crystal-melt interfaces, once formed, in metals and other fluid systems at even minute undercooling. The methods of nucleation study which have proven especially effective in bypassing nucleation by heterophase impurities thereby exposing the high resistance of melts to homophase nucleation may be summarized as follows: observation of the crystallization behavior of dispersed small droplets; drop tube experiments in which liquid drops solidify, under containerless conditions, during their fall in the tube; and observation of the crystallization of bulk specimens immersed in fluxes chosen to dissolve or otherwise deactivate (e.g., by wetting) heterophase nucleants. This method has proven to be remarkably effective in deactivating such nucleants in certain pure metals. Author

N84-34591*# Connecticut Univ., Storrs.
BULK UNDERCOOLING
Theo Z. Kattamis *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 15-32 (For primary document see N84-34589 24-26)

Avail: NTIS HC A09/MF A01 CSCL 11F

Bulk undercooling methods and procedures will first be reviewed. Measurement of various parameters which are necessary to understand the solidification mechanism during and after recalescence will be discussed. During recalescence of levitated, glass-encased large droplets (5 to 8 mm diam) high speed temperature sensing devices coupled with a rapid response oscilloscope are now being used at MIT to measure local thermal behavior in hypoeutectic and eutectic binary Ni-Sn alloys. Dendrite tip velocities were measured by various investigators using thermal sensors or high speed cinematography. The confirmation of the validity of solidification models of bulk-undercooled melts is made difficult by the fineness of the final microstructure, the ultra-rapid evolution of the solidifying system which makes measurements very awkward, and the continuous modification of the microstructure which formed during recalescence because of precipitation, remelting and rapid coarsening. Author

N84-34592*# Case Western Reserve Univ., Cleveland, Ohio.
THE POTENTIAL FOR BULK UNDERCOOLING AS AN INDUSTRIAL PROCESS
V. Laxmanan *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 33-70 refs (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

The main focus is on solidification occurring in highly supercooled melts. Solidification rates in such melts are extremely high, an attractive feature from a commercial standpoint. Thus, the reported growth velocities for pure Ni and Co dendrites at a supercooling of 175 K are in excess of 180 km/hr. Rapidly quenched crystalline alloys produced by various atomization processes (e.g., centrifugal atomization or inert gas atomization) or melt spinning are examples of solidification processes, currently being intensively explored commercially, wherein extremely high solidification rates are achieved. Estimated dendrite tip growth rates are about 2 km/hr in a binary Al-4.5 wt % alloy, with a heat transfer coefficient of 6.4x10 sub 5 w/sq cm K or 15 cal/cu cm sK. In the limit, when the solidification rate exceeds a critical value, a glassy microstructure is obtained even in highly alloyed melts, which under normal conditions would solidify to form one or more crystalline phases. Glassy metals, also called metallic glasses, are candidate materials for distribution transformers because of their very low energy losses and are also being used in brazing and soldering applications. Author

N84-34593*# TRW, Inc., Cleveland, Ohio. Materials and Manufacturing Technology Center.
POROSITY AND ENVIRONMENT
Thomas S. Piwonka *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 71-78 refs (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

Significant progress was achieved when it was realized that porosity could be analyzed successfully by considering not only heat flow, but also fluid flow within the solidifying casting. Sound castings may be produced by lowering pressure during melting (to allow dissolved gas to escape the melt) and increasing pressure during solidification (to force liquid metal into the mushy zone to feed shrinkage). Such techniques are especially effective if they are combined with chilling of parts of the casting to produce progressive solidification, which shortens the mushy zone and, hence, the distance that metal must travel to feed porosity. B.G.

N84-34594*# British Columbia Univ., Vancouver.
THE MOVEMENT OF PARTICLES IN LIQUID METALS UNDER GRAVITY FORCES AND THE INTERACTION OF PARTICLES WITH ADVANCING SOLID-LIQUID INTERFACE
F. Weinberg *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 79-90 refs (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

The problems of shrinkage and gas porosity are discussed. Gravity forces enhance the removal of gas bubbles from a metal melt and contribute to the feeding of shrinkage porosity in castings. Experiments are reviewed which determine how large a density difference is required for metal particles to float or sink in a metal melt and to what extent do factors not considered in Stokes Law influence particle movement in a real system. As to the interaction of particles with an advancing solid-liquid interface, the results indicate that the metal particles are not rejected in a metal melt, and that concentrations of particles in a metal following solidification are due to other factors. E.R.

N84-34595*# Case Western Reserve Univ., Cleveland, Ohio.
CHANGES IN SOLIDIFIED MICROSTRUCTURES
John F. Wallace *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 91-104 refs (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

The properties and casting behavior of metals are significantly affected by their cast structure. This structure is optimized by producing columnar versus equiaxed grains and coarse versus fine grains by controlling solidification conditions. The transition from columnar to equiaxed grains is favored by: constitutional supercooling with effective nucleation of free dendrites; melting off and transport of dendrite tips and arms; mechanical vibration; falling down of free dendrites from a chilled top surface; and induced flow in the solidifying structure by oscillation of rotation. Author

N84-34596*# Cabot Corp., Kokomo, Ind.
SOLIDIFICATION STUDY OF SOME NI- AND Co-BASE ALLOYS
Christian L. Jeanfils *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 105-116 (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

An ongoing research program aims to characterize the solidification of several Ni- and Co-based commercial wrought type alloys. The techniques used and the data items sought are: (1) thermal analysis, liquidus, nonequilibrium solidus as a function of cooling rate, secondary reactions temperatures, incipient melting, progress of solidification as a function of temperature; (2) optical metallography, characteristic structures and secondary dendrite arm spacing as a function of cooling rate; (3) X-ray diffraction, identification of precipitates; and (4) SEM/EDAX, measure of microsegregation. Author

N84-34597*# National Bureau of Standards, Gaithersburg, Md.
MICROSEGREGATION DURING DIRECTIONAL SOLIDIFICATION
S. R. Coriell and G. B. McFadden *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 117-138 refs Sponsored in part by DARPA (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

During the directional solidification of alloys, solute inhomogeneities transverse to the growth direction arise due to morphological instabilities (leading to cellular or dendritic growth) and/or due to convection in the melt. In the absence of convection, the conditions for the onset of morphological instability are given by the linear stability analysis of Mullins and Sekerka. For ordinary solidification rates, the predictions of linear stability analysis are similar to the constitutional supercooling criterion. However, at very rapid solidification rates, linear stability analysis predicts a vast increase in stabilization in comparison to constitutional supercooling. Author

N84-34598*# Special Metals Corp., New Hartford, N.Y.
CHARACTERIZATION OF MACROSEGREGATION IN ESR IN-718
J. A. Domingue, K. O. Yu, and H. D. Flanders *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 139-150 refs (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

Aspects of macrosegregation theory, such as dendrite arm spacing, pool profile and mushy zone depth are beneficial to developing consumable melting process for Ion Nickel IN-718, Electro-Slag Refining, especially ESR. Aspects of microsegregation theory, such as correlation of dendrite arm spacing with heat transfer mechanisms and local solidification time, are used to minimize remnant dendritism in both ESR and Vacuum Arc Remelting VAR IN-718. Specifically, ESR IN-718 must be optimized by developing practices which maximize ingot cooling rate and minimize the steepness of the solidus and liquidus isotherms. The knowledge concerning macrosegregation in consumable melted IN-718 is in the form of correlations. Since the isotherm steepness is undoubtedly involved, investigations which include a microgravity environment might separate microsegregation effects from macrosegregation effects. Accounting for the effects of gravity and density differences between the metal pool and the interdendritic fluid, in combination with the pool and mushy zone profiles, can lead to improved melting solidification practices for IN-718, and allow prediction of macrosegregation tendency to be incorporated into high temperature alloy design. M.A.C.

N84-34599*# Pittsburgh Univ., Pa.
SOLIDIFICATION STRUCTURES GROWN UNDER INDUCED FLOW AND CONTINUOUS CASTING OF STEEL
Alexander A. Tsavaras *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 151-156 (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

The use of induced flow as a means to control solidification structures in strand cast steel is investigated. The quality problems in strand cast steel stemming from columnar growth can be partially controlled, by Electro Magnetic Stirring (EMS). Induced flow changes the normal morphology of dendrites. Solids grown under intense stirring conditions show both negative and positive segregation which is considered unacceptable by some steel producers. The inclusion size and population is strongly affected by induced flow (EMS). Laboratory and industrial data show substantial reduction in inclusion size and content, but the overall effect of flow on inclusions is affected by the particular type of flow patterns utilized in each case. Productivity and quality are raised substantially in steel strand casting by utilizing EMS. M.A.C.

N84-34600*# Aluminum Co. of America, Alcoa Center, Pa.
MACROSEGREGATION IN ALUMINUM ALLOY INGOT CAST BY THE SEMICONTINUOUS DIRECT CHILL METHOD
H. Yu and D. A. Granger *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 157-168 refs (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

A theoretical model of the semicontinuous DC casting method is developed to predict the positive segregation observed at the subsurface and the negative segregation commonly found at the center of large commercial-size aluminum alloy ingot. Qualitative analysis of commercial-size aluminum alloy semicontinuous cast direct chill (DC) ingot is carried out. In the analysis, both positive segregation in the ingot subsurface and negative segregation at the center of the ingot are examined. Ingot subsurface macrosegregation is investigated by considering steady state casting of a circular cross-section binary alloy ingot. Nonequilibrium solidification is assumed with no solid diffusion, constant equilibrium partition ratio, and constant solid density. M.A.C.

N84-34601*# California Univ., Santa Barbara.
A REVIEW OF OUR PRESENT UNDERSTANDING OF MACROSEGREGATION IN INGOTS
Robert Mehrabian *In* NASA. Lewis Research Center Fundamentals of Alloy Solidification Appl. to Industrial Processes Sep. 1984 p 169-186 (For primary document see N84-34589 24-26)
Avail: NTIS HC A09/MF A01 CSCL 11F

The present understanding of the mechanisms responsible for macrosegregation occurring in ingots produced by electroslag remelting (ESR), vacuum arc remelting (VAR), direct chill (DC), and continuous casting is reviewed. A detailed description is given of laboratory experiments on model Sn-Pb and Al-Cu alloys. The experimental findings are compared with theoretical predictions. Data are also presented on a high-temperature Ni-27 wt % Mo alloy ESR ingot and 2000 series aluminum alloy DC ingots. Comparison is made to theoretical predictions where appropriate. M.A.C.

N84-34602*# National Aeronautics and Space Administration, Washington, D. C.
DIRECTIONAL SOLIDIFICATION OF Al2-Cu-Al AND Al3-Ni-Al EUTECTICS DURING TEXUS ROCKET FLIGHT
J. J. Favier and J. deGoer Jun. 1984 61 p refs Transl. into ENGLISH of rept. DMG-93/83 Centre d'Etudes Nuclaires de Grenoble, France, Nov. 1983 p 1-56 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77552; NAS 1.15:77552; DMG-93/83) Avail: NTIS HC A04/MF A01 CSCL 11F

One lamellar eutectic sample and one fiber-like eutectic sample were solidified directionally during the TEXUS-6 rocket flight. The microstructures and the results of the thermal analysis, obtained from the temperatures recorded on the cartridge skin, are compared. No appreciable modifications of the regularity of the eutectic structures were observed by passing from 1 g to 0.0001 g in these experiments. No steady state growth conditions were achieved in these experiments. Author

N84-34603*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION OF CANDIDATE STIRLING ENGINE HEATER TUBE ALLOYS AFTER 3500 HOURS EXPOSURE TO HIGH PRESSURE DOPED HYDROGEN OR HELIUM Final Report
John A. Misencik and Robert H. Titran Oct. 1984 46 p refs
(Contract DE-AI01-77CS-51040)
(NASA-TM-83782; E-2276; DOE/NASA/51040-56; NAS 1.15:83782) Avail: NTIS HC A03/MF A01 CSCL 11F

The heater head tubes of current prototype automotive Stirling engines are fabricated from alloy N-155, an alloy which contains 20 percent cobalt. Because the United States imports over 90 percent of the cobalt used in this country and resource supplies could not meet the demand imposed by automotive applications of cobalt in the heater head (tubes plus cylinders and regenerator housings), it is imperative that substitute alloys free of cobalt be identified. The research described herein focused on the heater head tubes. Sixteen alloys (15 potential substitutes plus the 20 percent Co N-155 alloy) were evaluated in the form of thin wall tubing in the NASA Lewis Research Center Stirling simulator materials diesel fuel fired test rigs. Tubes filled with either hydrogen doped with 1 percent CO2 or with helium at a gas pressure of 15 MPa and a temperature of 820 C were cyclic endurance tested for times up to 3500 hr. Results showed that two iron-nickel base superalloys, CG-27 and Pyromet 901 survived the 3500 hr endurance test. The remaining alloys failed by creep-rupture at times less than 3000 hr, however, several other alloys had superior lives to N-155. Results further showed that doping the hydrogen working fluid with 1 vol % CO2 is an effective means of reducing hydrogen permeability through all the alloy tubes investigated. Author

N84-34604# General Electric Co., Schenectady, N. Y.
INVESTIGATION OF RAPIDLY SOLIDIFIED Ni3Al-BASED ALLOYS Final Report, 1 Mar. 1983 - 29 Feb. 1984
S. C. Huang, K. M. Chang, and A. I. Taub 31 May 1984 38 p
(Contract N00014-83-C-0199)
(AD-A144174; AD-E301443; Rept-84SRD034) Avail: NTIS HC A03/MF A01 CSCL 11/6

The addition of one atom percent boron to Ni3Al makes this otherwise-brittle alloy ductile. Rapid solidification also makes it strong. The effects of boron concentration, Ni:Al stoichiometry, and quaternary element additions were studied and are reported. Author (GRA)

N84-34605# Solar Turbines International, San Diego, Calif.
EROSION MECHANISMS OF METALS Final Report, Jul. 1978 - Aug. 1983
M. E. Gulden and K. G. Kubarych Mar. 1984 108 p
(Contract F49620-78-C-0104)
(AD-A144194; SR84-R-4526-03; AFOSR-84-0633TR) Avail: NTIS HC A06/MF A01 CSCL 11/6

This final report summarizes the experimental approach was to initially study a single alloy which exhibits a transition from brittle to ductile type erosion response at room temperature. At a later stage, the dynamic hardness of several substrate materials, both pure metals and alloys, was measured in order to provide a material property obtained under dynamic conditions similar to those during an actual erosion event. The results can be conveniently separated into two phases as follows: Erosion Material Removal Mechanisms, and Correlation Between Dynamic Hardness and Erosion. GRA

N84-34606# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Metallurgical Engineering and Materials Science.
STRESS CORROSION CRACKING OF WROUGHT AND P/M HIGH STRENGTH ALUMINUM ALLOYS Annual Technical Report, 1 Jan. - 31 Dec. 1983
A. W. Thompson and I. M. Bernstein 1 Mar. 1984 12 p
(Grant AF-AFOSR-0041-81)
(AD-A144279; CMU-AFOSR-AL-7; AFOSR-84-0613TR) Avail: NTIS HC A02/MF A01 CSCL 11/6

The combined results of the first three years of the program are presented, with emphasis on the stress corrosion cracking and hydrogen embrittlement of the PM 7090 Al alloy. Additional results on 7075 are also given. In particular, the role of temper and loading mode in susceptibility were examined for three test methods--time to failure of notched round bar specimens in a brine solution; straining electrode tests on notched round specimens under cathodic charging; and tensile tests on hydrogen pre-charged notched round specimens. These tests form the basis for an extensive, completed Ph.D. thesis which is summarized here. Stress corrosion testing has also been conducted on 7075 in aluminum chloride solutions and on HP 7075. We remain confident that we have established the basis and a good portion of the results necessary to understand, predict and model the role of hydrogen in stress corrosion cracking of high-strength aluminum alloys. GRA

N84-34607# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RARE-EARTH METALS AND THEIR APPLICATIONS IN AVIATION
Z. Changzhong and L. Zhonghan 1 Aug. 1984 13 p Transl. into ENGLISH from Hang Kung Chih Shih (China), no. 9, 1976 p 46-48
(AD-A144410; FTD-ID(RS)T-0842-84) Avail: NTIS HC A02/MF A01 CSCL 11/6

The physical and chemical properties of rare earth metals are discussed. The effects of rare earth metals on the physical and mechanical properties of alloys are reviewed. Several common applications of rare earth metals are presented. R.S.F.

N84-34608# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE MANUFACTURING PROCESS AND THE COLD DEPLOYMENT TEST OF AN EXTENDIBLE NOZZLE MADE OF C-103 NIOBIUM ALLOY
H. Hong 30 Jul. 1984 25 p Transl. into ENGLISH from Yuhang Xuebao (China), no. 4, 1983 p 71-80
(AD-A144524; FTD-ID(RS)T-0819-84) Avail: NTIS HC A02/MF A01 CSCL 11/6

The salient features of an umbrella-type extendible rocket nozzle and the properties of C-103 niobium alloy are discussed. Attention is also given to the forming technique for this nozzle's cold test piece using shear spinning, extension forming and mandrel diameter expansion processes. Results from cold deployment tests were analyzed which provided necessary technical data for the initial sample production of the extendible nozzles. M.G.

N84-34609*# Spectrolab, Inc., Sylmar, Calif.
DEVELOPMENT OF METALLIZATION PROCESS: FSA PROJECT, CELL AND MODULE FORMATION RESEARCH AREA Quarterly Technical Progress Report
Alexander Garcia, III Feb. 1984 20 p
(Contract NAS7-100-956205)
(NASA-CR-173996; DOE/JPL-956205-84-6; NAS 1.26:173996; DE84-007773) Avail: NTIS HC A02/MF A01 CSCL 11F

New pastes were evaluated that contained additives to aid in the silicon-to-metallization contact. None were completely successful, however inks containing silver-organic compounds showed promise. DOE

N84-34610*# Purdue Univ., Lafayette, Ind.
MOD SILVER METALLIZATION FOR PHOTOVOLTAICS Quarterly Technical Report, 1 Dec. 1983 - 29 Feb. 1984
G. M. Vest and R. W. Vest 20 Mar. 1984 45 p
(Contract NAS7-100-956679)
(NASA-CR-173975; DOE/JPL-956679-84-1; NAS 1.26:173975; DE84-009623) Avail: NTIS HC A03/MF A01 CSCL 11F

It was determined that pyrolysis products can produce dark surface films on MOD silver conductors. Improving the purity of all ink ingredients helped this problem. It was established that the existence and nature of the surface film is influenced by the rate of air flow during firing and by the heating rate in the 70 to 225 C range, but these processing parameters have not as yet been optimized. Low temperature solvent removal was determined to be of prime importance in obtaining good adhesion between the MOD films and the substrate. For inks developed to date, 15 to 30 minutes at 60 to 70 C was required. It was also determined that the adhesion is influenced by the air flow rate during firing, the heating rate in the 100 to 250 C range, and the maximum firing temperature. Results during the first 3 months of effort on this project have demonstrated that it is essential to use generic compounds, and that the compounds must be prepared from high purity raw materials. It was also established that the quality and properties of the MOD silver films are intimately dependent on the time-temperature processing. All of the results obtained to date still indicate that MOD silver shows great promise for low temperature metallization of photovoltaic cells. DOE

N84-34611# International Centre for Theoretical Physics, Trieste (Italy).
ELECTRICAL CONDUCTIVITY IN RANDOM ALLOYS
Abhijit Mookerjee and M. Yussouff Jun. 1983 13 p refs Submitted for publication
(DE84-701207; IC-83/67) Avail: NTIS HC A02/MF A01

An augmented space formalism was developed and used with the Ward identity and Bethe Salpeter equation, to construct a complete formalism for the calculation of the electrical conductivity in tight-binding models of random binary alloys. The formalism is practical in the sense that viable calculations may be carried out with its help for realistics models of alloy systems. Author

N84-34612# Leiden Univ. (Netherlands).
AN EXPERIMENTAL STUDY OF PRASEODYMIUM INTERMETALLIC COMPOUNDS AT LOW TEMPERATURES Ph.D. Thesis
Franciscus Johannes Antonium Maria Greidanus [1983] 176 p refs
(DE83-704748; INIS-mf-8653; NL-83LO355) Avail: NTIS HC A09/MF A01

The low temperature properties of praseodymium intermetallic compounds are studied. The advantage of choosing praseodymium compounds is the simplicity of Pr(3+) as compared to Ho(3+), Tb(3+) and Tm(3+), due to its low angular momentum value. As a result, the eigenstates in cubic symmetry are independent of the ratio of fourth order to sixth order potential. A technique for performing magnetic susceptibility measurements below 1K is shown. Next, the theory of interacting Pr(3+) ions is examined,

with bilinear and biquadratic interactions. Experimental results on the cubic Laves phase compounds PrRh2, PrIr2, PrPt2, PrRu2, and PrNi2 are presented, and the crystalline electric field parameters of these compounds are given. Finally, praseodymium intermetallic compounds with low symmetry singlet ground states, and cubic compounds with magnetic doublet ground states are discussed. S.B.

N84-34613# Commissariat a l'Energie Atomique, Gif-sur-Yvette (France).
IRRADIATION CREEP OF SOLUTION ANNEALED AND COLD-WORKED 316 STAINLESS STEEL
JeanLouis Boutard, Yvette Carteret, Richard Cauvin, Yves Guerin, and Arlette Maillard Apr. 1983 11 p refs Presented at the Conf. on Dimensional Stability and Mech. Behaviour of Irradiated Metals and Alloys, Brighton, England, 11-13 Apr. 1983
(DE84-780404; CEA-CONF-6689) Avail: NTIS HC A02/MF A01

Because SA and CW 316 stainless steels were used as standard cladding material, a lot of plastic strain data is now available. Most of it is published and analyzed in terms of an irradiation creep modulus A defined as the ratio of the equivalent plastic strain to the product of the equivalent stress by the dose. In fact the experimental data and the theoretical analysis of the in-pile deformation mechanisms show a more complicated situation. The purpose is to reanalyze results taking into account this situation. DOE

N84-34614# Commissariat a l'Energie Atomique, Gif-sur-Yvette (France).
EFFECT OF DOSE RATE ON THE MICROSTRUCTURE OF CW 316 SS
Loic Boulanger, Lucien LeNaour, and Viviane Levy Apr. 1983 10 p refs Presented at the Conf. on Dimensional Stability and Mech. Behaviour of Irradiated Metals and Alloys, Brighton, England, 11-13 Apr. 1983
(DE84-780403; CEA-CONF-6688) Avail: NTIS HC A02/MF A01

In the high temperature range an increase in dose rate was found to increase the incubation dose for swelling in SA 316 SS and CW 316 SS. In fact a detailed analysis of the results seems to lead for a given material to the existence of a dose rate independent incubation time. This suggests that the effect of dose rate could essentially be due to the fact that, in a higher flux, a component spends less time at high temperature in the reactor to reach a given fluence, and as a consequence the achievement of a given microstructural evolution of the alloy is delayed. In fact the results obtained on the influence of irradiation time and dose rate on the microstructure obtained in SA 316 SS clearly show that there is a direct effect of the dose rate on the microstructure obtained at the end of the incubation period. The aim was to explain the microstructural and microchemical changes occurring after a constant irradiation time on CW 316 irradiated at different dose rates in the high temperature range, and to get a better understanding of its swelling behavior. DOE

N84-34476*# Ford Aerospace and Communications Corp., Palo Alto, Calif. Western Development Lab. Div.
FATIGUE INDUCED CRACKING IN ALUMINUM LN-2 SHROUD OF 39 FOOT VACUUM CHAMBER
Arthur A. Edwards *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 77-100 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 11F

N84-34513# Joint Publications Research Service, Arlington, Va.
ATTACHMENT FOR AN X-RAY DIFFRACTORMETER FOR STUDYING TRANSFORMATIONS IN MATERIALS Abstract Only
L. A. Monasevich and Yu. I. Paskal *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 4 Transl. into ENGLISH from Zavodsk. Lab. (Moscow), no. 7, Jul. 1983 p 32-34 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34518# Joint Publications Research Service, Arlington, Va.
HARDENING ALLOY SURFACES BY LASER IRRADIATION Abstract Only
A. G. Grigoryants, A. N. Safonov, V. M. Tarasenko, N. A. Makusheva, Ye. V. Kauts, and T. V. Gulyayeva *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 10 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekh. (Moscow), no. 9, Sep. 1983 p 124-131 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34519# Joint Publications Research Service, Arlington, Va.
THERMAL EFFECT OF PULSED LASER IRRADIATION ON THE SURFACE OF METALLIC MIRRORS Abstract Only
V. F. Gordeyev, A. L. Glytenko, and G. M. Kudinov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 12 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekh. (Moscow), no. 9, Sep. 1983 p 110-117 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34521# Joint Publications Research Service, Arlington, Va.
EFFECT OF STRETCH RATE ON TEXTURE AND MECHANICAL PROPERTIES OF NICKEL-COBALT ALLOYS Abstract Only
O. A. Kraskina, E. N. Spektor, and G. N. Epshteyn *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 31 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 5, Sep. - Oct. 1983 p 158-160 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34526# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND PROPERTIES OF AMORPHOUS POWDER MATERIAL AFTER EXPLOSIVE LOADING Abstract Only
O. V. Roman, A. P. Boganov, Yu. N. Voloshin, V. G. Gorobtsov, and I. M. Pikus *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 45 Transl. into ENGLISH from Metalloved. i Term. Obrabotka Metal. (Moscow), no. 10, Oct. 1983 p 57-59 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34527# Joint Publications Research Service, Arlington, Va.
ANODIC ELECTROCHEMICAL PROCESSING OF AMORPHOUS ALLOYS Abstract Only
N. I. Isayev, V. B. Yakovlev, E. K. Osipov, Ye. A. Trofimova, and V. Yu. Vasilyev *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 46 Transl. into ENGLISH from Metalloved. i Term. Obrabotka Metal. (Moscow), no. 10, Oct. 1983 p 54-57 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34528# Joint Publications Research Service, Arlington, Va.
AMORPHOUS METALLIC MATERIALS Abstract Only
Yu. K. Kovneristyy *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 46-47 Transl. into ENGLISH from Metalloved. i Term. Obrabotka Material. (Moscow), no. 9, Sep. 1983 p 2-9 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34531# Joint Publications Research Service, Arlington, Va.
MODERN METHODS OF STUDYING INITIAL STAGE OF FATIGUE FRACTURE IN METALS Abstract Only
V. I. Pokhmurskiy, Yu. V. Dzoba, and N. Ya. Yaremchenko *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 50 Transl. into ENGLISH from Fiz.-Khim. Mekh. Material. (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 3-14 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34532# Joint Publications Research Service, Arlington, Va.
CARBIDE PHASES IN HIGH-TEMPERATURE NICKEL-HAFNIUM ALLOYS Abstract Only
S. T. Kishkin, G. B. Stroganov, A. V. Logunov, Ye. A. Kuleshova,

I. M. Khatsinskaya, and N. V. Petrushin *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 51 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 5, Sep. - Oct. 1983 p 143-149 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34534# Joint Publications Research Service, Arlington, Va.
SIGNIFICANCE OF THE ENVIRONMENT IN CORROSION CRACKING OF Al-Mg AND Al-Li-Mg SYSTEM ALLOYS Abstract Only
L. A. Kurtasova and V. M. Polyanskiy *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 1 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Lvov, USSR), v. 19, no. 2, Mar. - Apr. 1983 p 29-34 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34535# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND PROPERTIES OF GRANULATED ALUMINUM ALLOYS CONTAINING TRANSITION METALS Abstract Only
V. I. Dobatkin, V. I. Yelagin, and V. M. Fedorov *In its* USSR Rept.: .Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 2 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 3, May - Jun. 1983 p 93-98 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34542# Joint Publications Research Service, Arlington, Va.
PASSIVATION OF AMORPHOUS ALLOYS WITH VARIOUS PHOSPHORUS CONTENTS Abstract Only
V. Yu. Vasilev, M. V. Zudin, and N. N. Rodin *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 10-11 Transl. into ENGLISH from Zashchita Metallov (Moscow), v. 19, no. 3, May - Jun. 1983 p 401-404 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34543# Joint Publications Research Service, Arlington, Va.
MATCHED EVAPORATION OF ALLOYS IN A VACUUM Abstract Only
Yu. D. Klebanov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 12 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 111-113 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34544# Joint Publications Research Service, Arlington, Va.
THERMAL PHYSICS OF PLASMA ATOMIZATION ONTO FIBER MATERIALS Abstract Only
Ye. M. Ivanov and V. V. Kudinov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 12-13 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 46-51 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34546# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF LASER HARDENING ON MECHANICAL PROPERTIES OF TYPE 45 STEEL Abstract Only
V. S. Velikikh, V. P. Goncharenko, A. V. Romanenko, and V. F. Terentyev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 13-14 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 21-25 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34549# Joint Publications Research Service, Arlington, Va.
FAILURE OF ALUMINUM ALLOY IN THE PRESPLITTING STAGE Abstract Only
V. I. Romanchenko *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 15-16 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 6, Jan. 1983 p 45-49 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34553# Joint Publications Research Service, Arlington, Va.
CORROSION PROTECTIVE PROPERTIES OF COATINGS OBTAINED BY HYDRAULIC PULSE COMPACTING OF ALUMINUM POWDER Abstract Only
V. N. Polyakov, M. N. Lobashev, and V. B. Yakovlev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 21-22 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 36-68 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34554# Joint Publications Research Service, Arlington, Va.
HYDROGEN EMBRITTLEMENT OF TITANIUM AND ITS ALLOYS Abstract Only
B. A. Kolachev and V. D. Talalyev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 23 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 3, May - Jun. 1983 p 87-92 Original language doc. previously announced in IAA as A83-36884 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01.

N84-34555# Joint Publications Research Service, Arlington, Va.
ELECTROCHEMICAL BEHAVIOR OF AMORPHOUS TITANIUM-BASED ALLOY AFTER VARIOUS ANNEALING CONDITIONS Abstract Only
N. D. Tomashov, I. B. Skvortsova, P. B. Budberg, V. V. Molokanov, and S. P. Alisova *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 24 Transl. into ENGLISH from Zashchita Metallov (Moscow), v. 19, no. 3, May - Jun. 1983 p 398-400 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34556# Joint Publications Research Service, Arlington, Va.
GENERATION OF REACTIVE STRESSES IN TiNi ALLOY Abstract Only
V. A. Likhachev, M. V. Masterova, A. N. Marshalkin, and I. Yu. Makarov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 25 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 4, Apr. 1983 p 72-74 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34557# Joint Publications Research Service, Arlington, Va.
RELATIONSHIP OF STRUCTURE WITH CYCLIC CRACK RESISTANCE OF ALPHA-TITANIUM ALLOYS Abstract Only
A. G. Bochvar, V. F. Terentyev, and I. S. Kogan *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 26-27 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Metally (Moscow), no. 3, May - Jun. 1983 p 146-149 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34559# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF CONDITIONS AND MEDIUM OF ANNEALING ON SHORT-TERM STRENGTH AND FATIGUE RESISTANCE OF WELDED JOINTS IN OT4 TITANIUM ALLOY Abstract Only
I. I. Muravyev, A. B. Kolomenskiy, B. A. Kolachev, and V. V. Shevchenko *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 28-29 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 5, May 1983 p 21-25 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34563# Joint Publications Research Service, Arlington, Va.
DISCUSSION OF SUPERPLASTICITY EFFECT
A. Tikhonov and A. Bazyk *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 34-37 Transl. into ENGLISH from Pravda (Moscow), 28 Apr. 1983 p 3 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34565# Joint Publications Research Service, Arlington, Va.
STUDY OF SUPERFINE INTERACTIONS IN AMORPHOUS CHROMIUM-CONTAINING ALLOYS BY MOSSBAUER SPECTROSCOPY Abstract Only
G. N. Belozerskiy, V. G. Semenov, and S. A. Chekashova *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 48 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 55, no. 5, May 1983 p 923-930 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34566# Joint Publications Research Service, Arlington, Va.
ANODIC DISSOLUTION OF TRANSITION METAL CARBIDES AT HIGH CURRENT DENSITY Abstract Only
N. A. Amirkhanova, L. G. Rafikova, and O. N. Tatarinova *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 49-50 Transl. into ENGLISH Zashchita Metallov (Moscow), v. 19, no. 3, May - Jun. 1983 p 412-414 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34567# Joint Publications Research Service, Arlington, Va.
PRODUCTION METHODS AND PROPERTIES OF METAL POWDERS FOR HIGH TEMPERATURE PRESSING Abstract Only
G. A. Krivonos, V. M. Blekherov, and V. G. Golubkov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 50 Transl. into ENGLISH from Kuznechno-Shtampovochnoye Proizv. (Moscow), no. 5, May 1983 p 20-22 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34569# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF BOUNDARY VOLUME STRUCTURE ON GRAIN BOUNDARY RELAXATION OF CAST HEAT RESISTANT NICKEL ALLOYS Abstract Only
A. S. Nagin and V. N. Gadalov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 51 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 106-110 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34570# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF NITROGEN-HYDROGEN-CONTAINING MEDIA ON HEAT RESISTANCE PROPERTIES OF NICKEL-BASED ALLOYS Abstract Only
A. L. Bichuya, Yu. D. Nikiforov, and Ye. P. Arskara *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 52 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 4, Apr. 1983 p 98-101 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-35044# National Central Univ., Chung-Li (Taiwan).
STUDY OF METAL-INSULATOR TRANSITION Abstract Only
Ta-Sun Yih, Tze-Ming Hsu, and Sheau-Huoy Chia *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 12 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35064# National Tsing Hua Univ., Hsinchu (Taiwan).
INTERFACIAL REACTIONS OF NICKEL AND COBALT THIN FILMS ON SILICON Abstract Only
Lih-Jiunn Chen *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 499-500 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N84-34615 Department of the Navy, Washington, D. C.
METHOD AND APPARATUS FOR DETERMINATION OF LUBRICANT STABILITY Patent
H. Wohltjen, P. J. Sniegoski, and H. Ravner, inventors (to Navy) Issued 20 Mar. 1984 6 p
(AD-D011193; US-Patent-4,438,203; US-Patent-Appl-SN-388358; US-Patent-Class-436-60) Avail: US Patent and Trademark Office CSCL 11/8

Method and apparatus for determining when a lubricant has reached the end of its useful life due to oxidative degradation. The apparatus continuously monitors the evolution of gaseous emission from the lubricant when subjected to oxidizing conditions, and detects the increased gas emission accompanying oxidative breakdown. Author (GRA)

N84-34616*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MELT-FLOW-TOUGHNESS MODIFIED POLYIMIDE Patent Application
Terry L. St.Clair and Harold D. Burks, inventors (to NASA) Filed 11 Sep. 1984 11 p
(NASA-Case-LAR-13135-1; NAS 1.71:LAR-13135-1; US-Patent-Appl-SN-649328) Avail: NTIS HC A02/MF A01 CSCL 11B

A process is disclosed for endcapping a polyimide system with an endcapping agent in order to achieve a controlled decrease in molecular weight and melt viscosity along with predictable fracture resistance of the molded products. The uncapped system is formed by combining an equimolar ratio of 4,4'-bis(3,4-dicarboxyphenoxy) disphenyl-sulfide dianhydride (BDSDA) and 1,3-bis(aminophenoxy)benzene (APB) dissolved in bis(2-methoxyethyl)ether. The endcapped system is formed by dissolving AFB in bis-(2-methoxyethyl)ether, adding the endcapping agent, and then adding the BDSDA. By varying the amount of endcapping from 0 to 4%, molecular weight is decreased from 13,000 to 8,660. At a processing temperature of 250 C, there is a linear relationship between molecular weight and viscosity, with the viscosity decreasing by two orders of magnitude as the molecular weight decreased from 13,900 to 8,660. A greater drop in viscosity is noted at higher temperatures. Apparent viscosity as a function of molecular weight at 250 C and at 280 C is depicted. Reducing the molecular weight also results in a linear decrease in the fracture resistance from 4100 J/sq m to 296 J/sq m. NASA

N84-34617# Aeronautical Research Labs., Melbourne (Australia).
THE USE OF ADHESIVE-BONDED RIVETS TO LESSEN THE REDUCTIONS IN FATIGUE LIFE CAUSED BY RIVET HOLES
J. Y. Mann, R. A. Pell, R. Jones, and M. Heller 1984 41 p refs (ARL-STRUC-Rept-399; AR-003-011) Avail: NTIS HC A03/MF A01

Rivet holes are potential sites for fatigue crack initiation in aircraft structures. Several methods for improving the life of such details were investigated including coating the surface of the hole with adhesive, cold-expansion of the holes, the insertion of close-fit rivets, and the use of adhesively-bonded rivets. An extruded bar and rolled plate made of aluminum alloy were used as fatigue specimens. Of the various techniques examined only that involving adhesively-bonded rivets provided any significant improvements in fatigue life. It resulted in a reduction in fatigue crack propagation rate of about 50% compared with that for specimens incorporating open holes. A finite element analysis indicated that adhesive bonding significantly reduces both the local stress concentration at the hole and the stress intensities at the crack tips, thus retarding crack initiation and reducing fatigue crack propagation rates. However, the effective reduction in stress intensity resulting from bonding (about 17%) is much less than the 50% predicted by the finite element analysis. This discrepancy is attributed mainly to

shortcomings in the model for defining the characteristics and behavior of the adhesive. R.S.F.

N84-34618*# National Aeronautics and Space Administration, Washington, D. C.
APPLICATION OF QUANTITATIVE MICROSCOPY TO CERAMICS
Yasuhiko Kondo Apr. 1984 30 p refs Transl. into ENGLISH from Ceramics (Japan), v. 18, no. 2, 1983 p 133-143 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77420; NAS 1.15:77420) Avail: NTIS HC A03/MF A01 CSCL 11B

Case studies were made of the graphite structures in cast iron. The form, size, distribution, and direction of the structures are described. Microscopic and stereoscopic techniques are discussed. R.S.F.

N84-34619*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE ROLE OF MATERIAL PROPERTIES IN ADHESION
Donald H. Buckley 1984 25 p refs Proposed for presentation at the 1984 Fall Meeting of the Mater. Res. Soc., Boston, 25-30 Nov. 1984
(NASA-TM-83792; E-2230; NAS 1.15:83792) Avail: NTIS HC A02/MF A01 CSCL 11B

When two solid surfaces are brought into contact strong adhesive bond forces can develop between the materials. The magnitude of the forces will depend upon the state of the surfaces, cleanliness and the fundamental properties of the two solids, both surface and bulk. Adhesion between solids is addressed from a theoretical consideration of the electronic nature of the surfaces and experimentally relating bond forces to the nature of the interface resulting from solid state contact. Surface properties correlated with adhesion include, atomic or molecular orientation, reconstruction and segregation as well as the chemistry of the surface specie. Where dissimilar solids are in contact the contribution of each is considered as is the role of their interactive chemistry on bond strength. Bulk properties examined include elastic and plastic behavior in the surficial regions, cohesive binding energies, crystal structure, crystallographic orientation and state. Materials examined with respect to interfacial adhesive interactions include metals, alloys, ceramics, polymers and diamond. They are reviewed both in single and polycrystalline form. The surfaces of the contacting solids are studied both in the atomic or molecularly clean state and in the presence of selected surface contaminants. Author

N84-34620*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OPTICAL AND OTHER PROPERTY CHANGES OF M-50 BEARING STEEL SURFACES FOR DIFFERENT LUBRICANTS AND ADDITIVE PRIOR TO SCUFFING
James L. Lauer (Rensselaer Polytechnic Inst.) and Norbert Marxer (Rensselaer Polytechnic Inst.) 1984 25 p refs Presented at Joint Lubrication Conf., San Diego, Calif., 22-24 Oct. 1984; sponsored by ASME and American Society of Lubrication Engineers
(NASA-TM-83746; E-2234; NAS 1.15:83746) Avail: NTIS HC A02/MF A01 CSCL 11H

An ester lubricant base oil containing one or more standard additives to protect against wear, corrosion, and oxidation was used in an experimental ball/plate elastohydrodynamic contact under load and speed conditions such as to induce scuffing failure in short times. Both the ball and the plate were of identically treated M-50 steel. After various periods of operating time the wear track on the plate was examined with an interference microscope of plus or minus 30 A depth resolution and sometimes also with a scanning ellipsometer and an Auger spectrometer. The optically deduced surface profiles varied with wavelength, indicating the presence of surface coatings, which were confirmed by the other instruments. As scuffing was approached, a thin (approximately A) oxide layer and a carbide layer formed in the wear track in particular when tricresylphosphate antiwear additive was present in the lubricant. The rates of the formation of these layers and their reactivity toward dilute alcholic HCl depended strongly on the lubricant and additives. Based on these results suggestions for improved formulations and a test method for bearing reliability could be proposed. R.J.F.

N84-34621# Battelle Columbus Labs., Ohio.
HOT ISOSTATIC PRESSING OF CERAMIC POWDER COMPACTS Annual Report, Jun. 1983 - Jun. 1984
J. K. McCoy and R. R. Wills 15 Jun. 1984 71 p
(Grant AF-AFOSR-0238-82; AF Proj. 2306)
(AD-A144123; AFOSR-84-0617TR; AR-2) Avail: NTIS HC A04/MF A01 CSCL 11/2

The effect of temperature, pressure and time on the rate of densification of submicron alumina powder during hot isostatic pressing has been determined using a dilatometer to continuously monitor volumetric changes. A FORTRAN computer program is used to make corrections for thermal expansion of the alumina and the stainless steel can, to determine the relative density of the alumina compact at any point, and to produce report ready graphs depicting the relationship between any two prescribed variables. Analysis of other errors associated with the use of the dilatometer shows that these are negligible compared with thermal expansion effects. The rate of densification is controlled by an interface reaction mechanism never previously observed in the densification of alumina. Mass transport is limited by the movement of grain boundary dislocations which act as sites for atoms to detach from grains. The actual rate limiting process is the diffusion of solute in the lattice since the motion of solute atoms can result in a large number of atoms being freed from a grain boundary dislocation. Once separated from the dislocation the atoms quickly diffuse away. GRA

N84-34622# Washington State Univ., Pullman. Dept. of Physics.
FRACTO-EMISSION FROM POLYMERS Annual Technical Report, Jun. 1983 - Jun. 1984
J. T. Dickinson 15 Jul. 1984 152 p
(Contract N00014-80-C-0213; NR Proj. 092-558)
(AD-A144149) Avail: NTIS HC A08/MF A01 CSCL 11/9

Progress in the investigation of fracto-emission (FE) from polymers is reported. Measurements characterizing the FE, experiments concerning FE mechanisms, and studies of factors influencing FE are discussed. This work includes: experimental evidence for and presentation of a conceptual model for the charged particle emission mechanisms, studies of electron and positive ion emission from single crystals of PETN and the production of electrical breakdown by fracture. Also, the phenomenon of electron beam induced fracture is presented. Author (GRA)

N84-34623# Pennsylvania State Univ., University Park.
TAPE CASTING OF HONEYWELL PZT TYPE 3 POWDER Final Report, Feb. 1982 - Feb. 1984
J. V. Biggers, G. O. Dayton, and B. A. Jones Feb. 1984 65 p
(Contract N00014-82-C-0231)
(AD-A144215) Avail: NTIS HC A04/MF A01 CSCL 11/2

This is the fourth and final report in the series dealing with transfer of tape casting technology from The Pennsylvania State University, Materials Research Laboratory to Honeywell Ceramic Center. The report deals with characterization of H.C.C. PZT powder, and the process variables associated with tape casting of this powder. It was determined that the agglomeration nature of the powder is important to this process and for this reason both reprocessed (at MRL) and as-received powder was used in this study. Thickness, density and shrinkage data are monitored from the casting stage to the green tape, laminate and final multilayer stack. A firing study was conducted on pellet samples of HCC PZT type 3 powder. GRA

N84-34624# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.

EXTENDED ABSTRACTS OF THE PROCEEDINGS OF THE 2ND INTERNATIONAL SYMPOSIUM ON HALIDE GLASSES Final Report, 1 Jun. - 31 Dec. 1983

C. T. Moynihan 2 Aug. 1983 373 p Proc. held at Troy, N.Y., 2-5 Aug. 1983

(Contract N00014-83-G-0091)

(AD-A144269; AD-E401208) Avail: NTIS HC A16/MF A01 CSCL 11/2

This document is the Extended Abstracts of the 2nd International Symposium on Halide Glasses held at Rensselaer Polytechnic Institute, August 2-5, 1983. It contains extended abstracts of 60 papers on optical, thermal, electrical and mechanical properties of halide glasses and on their potential applications. Author (GRA)

N84-34625# Rockwell International Corp., Thousand Oaks, Calif.

STRENGTHENING AND STRENGTH UNIFORMITY OF STRUCTRAL CERAMICS Annual Report, 1 Feb. 1983 - 31 Jan. 1984

F. F. Lange Apr. 1984 76 p

(Contract F49620-81-C-0036)

(AD-A144302; SC5295.3AR; AFOSR-84-0606TR) Avail: NTIS HC A05/MF A01 CSCL 11/2

The goal of this work is to identify the processing flaws that limit the strength of sintered ceramics, and to engineer uniform microstructures which either eliminate or minimize the size of these processing flaws. During the first year, a major advance was made by uncovering the fact that agglomerates in powders produce crack-like voids that severely limit the strength of sintered ceramics. Crack-like voids produced by the differential sintering of agglomerates relative to their surrounding powder matrix can be the most detrimental strength degrading flaw in sintered ceramics. As detailed and summarized in the review prepared for a 1984 ASM Conference on Materials for Future Energy Systems, colloidal approaches to powder processing and consolidation can minimize the size of soft agglomerates (those that can be broken apart with surfactants) and hard agglomerates (eliminated by sedimentation of colloidal suspensions). Work has shown that the elimination of the large, soft agglomerates with surfactants increases the average strength of a transformation toughened Al2O3/30 v/o ZrO2 (2.5 v/o Y2O3) composite from 550 MPa (80,000 psi) to 930 MPa (135,000 psi). GRA

N84-34626# Gulf South Research Inst., New Orleans, La.

ENCAPSULATED MULTIFUNCTION CORROSION INHIBITIVE PRIMER Final Report, Sep. 1979 - Jan. 1983

D. V. Gupta, J. Grawe, F. Bowen, I. Cavasso, and J. K. Smith Wright-Patterson AFB, Ohio AFWAL Nov. 1983 366 p

(Contract F33615-79-C-5061)

(AD-A144311; AFWAL-TR-83-4123) Avail: NTIS HC A16/MF A01 CSCL 11/3

Air Force Contract F33615-79-C-5061 investigates the possibility of using highly water soluble corrosion inhibitors as an aircraft primer as a replacement primer for hexavalent chromium primers which have been under attack for toxicity. The difficult problem of coating blistering which has made water soluble inhibition little used in primers is approached with the use of microencapsulation of the inhibitors and control release polymers to obtain controlled release. Additionally direct incorporation in the primer matrix with controlled pigment volume concentration to control internal pressures and other methods are shown. Steel inhibition showed promise as well as release polymers for corrosion protection. Some state-of-the-art corrosion pigments showed promise for aluminum and steel but none of the inhibitors performed as well as chromate inhibitors currently being used on Air Force aircraft. Author (GRA)

N84-34627# Massachusetts Inst. of Tech., Cambridge. Energy Lab.

SINTERABLE CERAMIC POWDERS FROM LASER HEATED GAS PHASE REACTIONS AND RAPIDLY SOLIDIFIED CERAMIC MATERIALS Technical Report, 1 Apr. 1982 - 31 May 1984

J. S. Haggerty Jul. 1984 133 p

(Contract N00014-82-K-0350)

(AD-A144439; MIT-EL-84-009) Avail: NTIS HC A07/MF A01 CSCL 11/2

CO2 lasers have been employed to heat reactant gases to synthesize Si, Si3N4, and SiC powders. The powders are small, uniform in size, nonagglomerated, highly pure and of controlled crystallinity--all parameters considered ideal for fabrication of defect-free ceramic parts. The unique and uniform time-temperature histories achievable with laser heating permit these important characteristics to be realized. Dispersions of Si powders have been made and characterized extensively. These results have defined an appropriate strategy for making concentrated dispersions and have confirmed earlier preliminary results. Zeta-potential and photon correlation spectrometry have been used to study the effects of water contamination in the alcohol dispersants. Based on current results, we believe that concentrated dispersions will be achieved with steric rather than coulombic stabilization. Coulombic repulsive forces are effective only with dilute dispersions. Manufacturing cost analysis shows that submicron powders can be made at lower cost with gas phase processes than with comminution processes. The laser heat source does not contribute significantly to the total costs. Total manufacturing costs are dominated by even lower than present actual feed stock (SiH4) costs. Recent cost reductions indicate that acceptable SiH4 costs may be realized soon. GRA

N84-34628# Army Materials and Mechanics Research Center, Watertown, Mass.

SYNTHESIS OF MONOMERS FOR THE PREPARATION OF REGIOSPECIFICALLY SUBSTITUTED POLY (PHENYLACETYLENES) AS POTENTIAL CHEMICAL DETECTORS Final Report

S. E. Wentworth, J. B. Libby, and P. R. Bergquist Jun. 1984 17 p Presented at Mid-Atlantic Regional Meeting, Am. Chem. Soc., White Haven, Pa. Apr. 1983

(AD-A144690; AMMRC-TR-84-23) Avail: NTIS HC A02/MF A01 CSCL 07/3

A number of substituted phenylacetylenes have been prepared as precursors to poly(phenylacetylenes) having regiospecific substitution. These latter were required for a study attempting to correlate structure with electronic properties, especially conductivity. The following phenylacetylenes were prepared: o-, m-, and p-nitrophenylacetylene, p-trifluoromethylphenylacetylene, o-and p-aminophenylacetylene (m-commercially available), o-, m-, and p-acetamido, and m-and p-trifluoroacetamidophenylacetylene. Starting materials were the appropriate nitro or trifluoromethyl cinnamic acids. Bromination followed by dehydrobromination and decarboxylation gave the corresponding phenylacetylenes. The amino compounds were obtained by Zn/NH4OH reduction of the o- and p-nitrophenyl-acetylenes. Acylations were accomplished with acetic or trifluoroacetic anhydride. Author (GRA)

N84-34482*# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

AN ATOMIC OXYGEN FACILITY FOR STUDYING POLYMER MATERIALS FOR SPACECRAFT APPLICATIONS

R. C. Tennyson, J. B. French, L. J. Kok, J. Kleiman, and D. G. Zimcik (Communications Research Centre, Canada) *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 169-192 refs Sponsored in part by the Communications Research Centre (For primary document see N84-34468 24-18) Avail: NTIS HC A13/MF A01 CSCL 11B

N84-34509# Joint Publications Research Service, Arlington, Va.

ELECTROFILTERS FROM POLYMER MATERIALS Abstract Only

A. A. Moshkin, A. P. Losoto, A. A. Shevchenko, and S. A. Meliksetyan *In its* USSR Rept.: Chem. (JPRS-UCH-84-007) 25 Jun. 1984 p 1 Transl. into ENGLISH from Khim. i Neftyanoye Mashinostr. (Moscow), no. 2, Feb. 1984 p 16-17 (For primary document see N84-34508 24-23)

Avail: NTIS HC A05/MF A01

N84-34510# Joint Publications Research Service, Arlington, Va.
POLYMERS AS SUBSTITUTES FOR METAL AND LUMBER
A. Musifulin *In its* USSR Rept.: Chem. (JPRS-UCH-84-007) 25 Jun. 1984 p 41-50 Transl. into ENGLISH from Planovoye Kohzyaystvo (Moscow), no. 1, Jan. 1984 p 109-113 (For primary document see N84-34508 24-23)
Avail: NTIS HC A05/MF A01

N84-34511# Joint Publications Research Service, Arlington, Va.
POLYACETYLENE AND K
V. Mishin *In its* USSR Rept.: Chem. (JPRS-UCH-84-007) 25 Jun. 1984 p 51-60 Transl. into ENGLISH from Khim. i Zhizn (Moscow), no. 3, Mar. 1984 p 23-28 (For primary document see N84-34508 24-23)
Avail: NTIS HC A05/MF A01

N84-34515# Joint Publications Research Service, Arlington, Va.
AN APPROACH FOR ESTIMATING THE IMPACT OF CARBON-REINFORCED PLASTIC Abstract Only
K. K. Dudka, I. N. Preobrazhenskiy, and A. S. Shestakov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 7 Transl. into ENGLISH from Mekh. Kompozitnykh Materialov (Riga), no. 4, Jul. - Aug. 1983 p 624-628 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34568# Joint Publications Research Service, Arlington, Va.
CREEP OF LaCrO-3Cr CERAMIC-METALLIC MATERIAL Abstract Only
S. M. Barinov, V. S. Bakunov, V. S. Ivanov, Yu. L. Krasulin, and E. G. Spiridonov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 51 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 137-138 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N84-34629# Materials Research Labs., Melbourne (Australia).
THE EFFECTS OF IMPURITIES AND ADDITIVES ON THE GROWTH OF POLYCRYSTALLINE TNT
William S. Wilson Feb. 1984 20 p refs
(MRL-R-916; AR-003-897) Avail: NTIS HC A02/MF A01

Growth (thermal expansion) of polycrystalline TNT on thermal cycling depends upon the presence of impurities in the TNT. Growth increases with the concentrations of 2,4-dinitrotoluene and 2,3,4-trinitroluene individually (these materials are major impurities in commercial TNT), and these materials have a synergistic effect on growth when they are present together. On the other hand paraffin wax and beeswax, commonly added as desensitizers to TNT-based compositions, have no effect on the growth process. Finally, the presence of anthracene and 1-nitronaphthalene, additives recommended to reduce exudation and/or cracking in commercial TNT charges, increases growth in polycrystalline TNT. These results are fully in accord with the mechanism proposed previously to account for the growth process. Author

N84-34630# TRW, Inc., Redondo Beach, Calif. Chemistry Lab.
NAVY MOBILITY FUELS EVALUATION Final Report, 20 Sep. 1982 - 20 May 1984
E. Fishman, M. H. Mach, L. M. Fraser, and D. P. Moore 20 Jul. 1984 236 p
(Contract N00014-82-C-2370; F65-571)
(AD-A144171; AD-E301443; TRW-39364-6006-UT-00) Avail: NTIS HC A11/MF A01 CSCL 21/4

There were three tasks in this program: (1) Analytical Chemistry of Sulfur species in JP-5; (2) Materials Compatibility; and (3) Lubricity. A chromatographic process coupled with oxidation and reduction of eluate, was successful in providing samples from which a group of aromatic thiophenes were identified by GC/MS. The Materials Compatibility task accomplished quantitative measurements of the degradation of Milspec nitrile rubber, widely used for fuel system seals, in the presence of peroxide formed in JP-5. The vulnerability of nitrile rubber to fuel peroxide was shown to be determined by backbone unsaturation. For the resolution of the lubricity testing problem, it has been demonstrated that the TRW/Lucas Tester provides reproducible values of the friction factor, a property of the fuel itself, which relates directly to boundary lubrication and gear scoring. GRA

N84-34631# Pratt and Whitney Aircraft Group, West Palm Beach, Fla. Government Products Div.
INVESTIGATION OF THERMAL COKING RATES OF AIR FORCE JET FUELS Final Report, Mar. 1982 - Jan. 1984
W. J. Purvis Mar. 1984 161 p
(Contract F33615-82-C-2210)
(AD-A144421; PWA/FR-17211; AFWAL-TR-84-2004) Avail: NTIS HC A08/MF A01 CSCL 21/2

This study evaluated the rates of deposit for selected jet fuels as a function of temperature and the effect of several current fuel additives on the rates of thermal deposition. Tests were run on the fuels with various concentrations of the additives and various levels of aromatic content. Deposits were collected on stainless steel coupons using an experimental coking apparatus that was developed for this program. It was found that the breakpoint temperature decreased and the concentration of peroxide increased as the aromatic content of the fuels increased. The rate of formation of deposits increased with decreases in the breakpoint temperature. The presence of different fuel additives had substantial effects on the rate of deposition. GRA

N84-34632# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
DEFLAGRATION TO SHOCK TO DETONATION TRANSITION OF ENERGETIC PROPELLANTS Annual Technical Report, 1 Jun. 1983 - 30 May 1984
H. Krier, P. B. Butler, and C. Cudak Jul. 1984 44 p
(Grant AF-AFOSR-0145-81)
(AD-A144469; UILU-ENG-84-4006; AFOSR-84-0634TR) Avail: NTIS HC A03/MF A01 CSCL 21/8

It is well known that explosive-based propellants are susceptible to detonation from the controlled deflagration mode of combustion. In some instances a confined zone of granulated propellant adjacent to a zone of cast propellant can provide a rapid enough pressure-rise rate to shock initiate the cast material. If the cast propellant has voids, the detonation will initiate at some location ahead of the granulated bed/cast material interface. This report is a summary of the research activities that focus on the analysis and modeling of the physics of such highly transient flows. GRA

N84-34633# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero-propulsion Lab.
DECISION RECOMMENDATION BOARD (DRB) REPORT. TRANSITION OF SHALE JP-4 TO THE OPERATIONAL VALIDATION PHASE Final Report, Aug. 1983 - May 1984
B. P. Botteri, A. V. Churchill, and C. G. Bleidorn 15 May 1984 23 p
(AD-A144504; AFWAL-TR-84-2050) Avail: NTIS HC A02/MF A01 CSCL 21/4

HQ USAF Program Management Directive (18 Sep. 1980), for PE71112F established an Air Force commitment to begin the operational validation of JP-4 fuel made from shale oil in 1984. The Air Force Systems Command was designated as participating command and given specific responsibilities for providing product quality, performance, system safety and environmental and health assurances prior to the start of any operational validation testing. The Shale JP-4 Decision Recommendation Board (DRB) was established in August 1983 to provide an independent assessment of the acceptability of transitioning shale JP-4 fuel to the operational

validation phase. This report addresses the acceptability of transitioning shale JP-4 to Mountain Home AFB, Idaho, and Hill AFB, Utah, the two bases selected by the Air Staff for the Validation Program. Extensive shale JP-4 fuel properties characterization and aircraft system testing have been conducted by AFSC primarily under the Aero Propulsion Lab's PE63215F. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N84-34634# Joint Publications Research Service, Arlington, Va.
WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT
16 Jan. 1984 91 p refs Transl. into ENGLISH from various worldwide articles
(JPRS-TTP-84-002) Avail: NTIS HC A05/MF A01

Recent developments in worldwide telecommunications are presented. Some areas covered are automatic telephone switching networks and domestic satellite communication systems in China; television transmissions and broadcasting schedules in South Africa; microwave relay project in Zambia; new markets for integrated circuit firms in Europe; microwave net for cable TV and satellite TV interests in Denmark; satellite telecommunications program in West Germany; new optical reader in France; and fiber optics for a phone net in Norway. For individual titles, see N84-34635 through N84-34638.

N84-34635# Joint Publications Research Service, Arlington, Va.
DOMESTIC SATELLITE COMMUNICATION SYSTEM TO BE ESTABLISHED IN CHINA c32
Zong Ruhou and Bao Yucheng *In its* Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 7-10 refs Transl. into ENGLISH from Xiandai Tongxin (Shanghai), no. 10, 1983 p 8-9 (For primary document see N84-34634 24-31)
Avail: NTIS HC A02/MF A01

The establishment of a domestic satellite communication system for China is discussed. To experiment, China built miniaturized ground stations and used the idle transponders of two INTELSAT satellites. The experiment was divided into three phases: verification and test of ground facilities; test of channel operations; and functional test of the Chinese built ground facilities. From a technical and economic point of view, developing China's domestic satellite communication system by leasing foreign satellites and building China's own ground stations is both efficient and effective. E.R.

N84-34636# Joint Publications Research Service, Arlington, Va.
NEW MARKETS FOR INTEGRATED CIRCUITS FIRMS IN UK, FRANCE AND WEST GERMANY c33
In its Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 51-53 refs Transl. into ENGLISH from Electron. Actualities (Paris), 11 Nov. 1983 p 46 (For primary document see N84-34634 24-31)
Avail: NTIS HC A05/MF A01

Developments in semiconductor technology by several firms located in Europe are discussed. Briefly explored are subscriber line interface circuits, coder-decoder devices, filters, modems, DTMF generators, other microphone amplifiers, protection circuits for telephone sets, and current and future private or public telephone exchanges. E.R.

N84-34637# Joint Publications Research Service, Arlington, Va.
REVIEW OF WEST GERMANY'S DFS SATELLITE TELECOMMUNICATIONS PROGRAM c32
In its Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 60-63 refs Transl. into ENGLISH from Flug Rev. (Stuttgart), Dec. 1983 p 30-31 (For primary document see N84-34634 24-31)
Avail: NTIS HC A05/MF A01

The purchase of telecommunication satellites by the German postal system is announced. Three satellites are under construction. One satellite is to take over actual operational functions, the second is to be parked in orbit, and the third is stored on the ground for emergencies. The services provided are discussed. The satellites are to enhance the cable and radio relay networks already in use. E.R.

N84-34638# Joint Publications Research Service, Arlington, Va.
THOMSON DEVELOPS NEW OPTICAL READER, DIGITAL SWITCHING SYSTEM: GIGADISC READER RECORDER c74
D. Levy *In its* Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 71-73 refs Transl. into ENGLISH from Electron. Actualities (Paris), 25 Nov. 1983 pp 1, 6 (For primary document see N84-34634 24-31)
Avail: NTIS HC A05/MF A01

A digital optical disk, newly developed by Thomson of France, is announced. The disk, which has a greatly enhanced data storage capacity, is capable of capturing a leading position in information processing and business communications systems by overtaking the share of the market now held by the flexible magnetic disk. A marketing strategy is presented. E.R.

N84-34639# Department of the Army, Washington, D. C.
PRECISION CUTTING OF MILLIMETER WAVE FERRITE MATERIALS Patent Application
Richard A. Stern and Richard W. Babbitt, inventors (to Army) Filed 9 Aug. 1984 8 p
(AD-D011179; US-Patent-Appl-SN-628553) Avail: NTIS HC A02/MF A01 CSCL 13/9

Ferrite material to be used in millimeter wavelength apparatus is sawed using a resin bonded diamond sawblade. A cutting speed of 5400 cm/sec is achieved by appropriate selection of sawblade diameter and spindle speed, such as 5.71 cm and 18,000 RPM. With this cutting speed and sawblade material a cut up to a maximum of 0.356 cm is possible while the ferrite is fed at/from 0.0254 to 0.127 cm/sec. Author (GRA)

N84-34640# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MACHINE TOOLS AND METALWORKING EQUIPMENT
25 Sep. 1984 38 p Transl. into ENGLISH from various Russian articles
(JPRS-UMM-84-017) Avail: NTIS HC A03

An assessment of the current status of the soviet machine tool industry is presented. Emphasis is placed on metal working equipment technology and industrial management. Robotics and automated line systems are also examined. For individual titles, see N84-34641 through N84-34644.

N84-34641# Joint Publications Research Service, Arlington, Va.
LASER IMPULSE DRILLING MACHINE DISCUSSED Abstract Only
L. G. Shafranskiy, M. R. Nikolayenko, A. A. Krivonogov, and A. M. Mironov *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-017) 25 Sep. 1984 p 8-10 Transl. into ENGLISH from Mashinostr. (Moscow), no. 5, May 1984 p 26-27 (For primary document see N84-34640 24-31)
Copyright. Avail: NTIS HC A03

The ability to drill holes 0.8 to 1.00 mm in diameter and 3 mm deep for bearings of magnetic relay armatures by laser impulses with an energy of up to 30 joules is examined. Existing blind holes in relay base plates are replaced by through holes. This change is made by two reference holes 1 and 2 produced along with other holes when punching the intermediate product of the base plate from sheet metal. The depth of the holes drilled by the lasers is determined by the distance between the reference holes from the front edge of the relay base plate. It is adopted as equal to 3 mm. M.A.C.

N84-34642# Joint Publications Research Service, Arlington, Va.
SMALL ORIFICE LASER CUTTING MACHINE VIEWED
V. S. Kovalenko and V. P. Dyatel *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-017) 25 Sep.

1984 p 14-15 Transl. into ENGLISH from Mashinostr. (Moscow), no. 4, Apr. 1984 p 24-25 (For primary document see N84-34640 24-31)
Copyright. Avail: NTIS HC A03

The ability to drill holes by a laser installation, and to improve the technological process of making holes in curvilinear pipe parts are examined. To achieve multi-impulse hole-making, the spherical mirrors of the optical resonator of the basic installation are replaced by flat ones and the charge/discharge circuit to feed the incandescent lamp for pumping the active element is changed so that the radiation impulse does not exceed 1 millisecond. The design and operation of the laser cutting machine are also described. M.A.C.

N84-34643# Joint Publications Research Service, Arlington, Va.
TECHNICAL FEATURES OF ROBOTIZED MACHINING SYSTEM VIEWED c37
V. I. Kokin, O. V. Chalov, and V. V. Balaburdin *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-017) 25 Sep. 1984 p 26-28 Transl. into ENGLISH from Mashinostr. (Moscow), no. 4, Apr. 1984 p 17 (For primary document see N84-34640 24-31)
Copyright. Avail: NTIS HC A03

A technical robot complex is introduced using a turning machine tool and industrial robot. A storage loader device to store the intermediate products and a storage-unloader device to receive and store finished parts, and a grip device are described. The operation of the electrical circuits of the robot, machine tool and the NC system are coordinated. M.A.C.

N84-34644# Joint Publications Research Service, Arlington, Va.
DECISION-MAKING PROCESS IN MANAGEMENT AUTOMATION c37
Ye. I. Vorobyev *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-017) 25 Sep. 1984 p 29-34 Transl. into ENGLISH from Mashinostr. (Moscow), no. 3, Mar. 1984 p 38-40 (For primary document see N84-34640 24-31)
Copyright. Avail: NTIS HC A03

The impact of management techniques on automatic production control is examined. The decision making process is described with emphasis on production efficiency, and interrelated, automated subsystems. The roles of data processing, organizational analysis, and personnel management in decision making are also discussed. M.A.C.

N84-34645# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY, NO. 157
29 Sep. 1983 64 p refs Transl. into ENGLISH from various West European articles
(JPRS-84434) Avail: NTIS HC A04/MF A01

This Western Europe report contains various studies in the areas of science and new technology. Subject matter covered includes: (1) applications pf GaAs technology; (2) electronic corporation development and stategy; and (3) development robots and robotics. For individual titles, see N84-34646 through N84-34650.

N84-34646# Joint Publications Research Service, Arlington, Va.
SWEDISH FIRM FIRST IN SCANDINAVIA TO MASTER GaAs TECHNOLOGY c76
Ingvor vanGinhoven *In its* West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1983 p 13-18 Transl. into ENGLISH from NY Teknik (Stockholm), 4 Aug. 1983 p 12-13 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

Rifa outside Stockholm is the first in Scandinavia to be able to manufacture super-fast components in a new material-gallium arsenide. Gallium arsenide is being hailed as one of the semiconductor materials of the future when speed requirements increase for computers and electronic devices. The conversion of signals has been one of the biggest stumbling blocks for rapid development in this area. Rifa now has a low-noise field-effect transistor, a laser diode and a photodiode in the new technology. The last two are made for use in fiberoptics. The transistor is meant for such things as microwave amplification on the radar band. The various applications of gallium arsenides are described further in this report. B.W.

N84-34647# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON PHILIPS R AND D STRATEGY, POLICIES, MAJOR EFFORTS c81
Claude Amalric *In its* West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1984 p 19-36 Transl. into ENGLISH from Lusine Nouvelle (Paris), 30 Jun. 1983 p 62-69 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

The Philips corporation's research and development strategy, policies and major efforts are described. Fluorescent lights, the electric razor, the magnetic cassette and the compact disc were all invented by Philips. This research has been extended by a very strong development policy. B.W.

N84-34648# Joint Publications Research Service, Arlington, Va.
OECD STUDY SHOWS SWEDEN HAS HIGHEST ROBOT-WORKER RATIO c37
Lars Dahl *In its* West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1983 p 37-38 Transl. into ENGLISH from Dagens Nyheter (Stockholm), 18 Aug. 1983 p 8 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

Sweden has the highest robot-worker ratio in the world. In Western Europe, Sweden has also been the leading nation in the development as well as the production and application of robots. Sweden has 30 robots for every 10,000 employees. OECD has concentrated on industrial robots on the basis of a very limited definition. Certain studies thus show that Japan has 100, 000 industrial robots. Industrial use of robots in Sweden is compared to the use of robots in Japan. B.W.

N84-34649# Joint Publications Research Service, Arlington, Va.
MIDI-ROBOTS GET UNDERWAY IN SEPTEMBER: LAB-INDUSTRY LINK c37
Jean-Jacques Chiquelin *In its* West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1983 p 39-40 Transl. into ENGLISH from Liberation (Paris), 22 Jun. 1983 p 18 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

The CNRS (National Center for Scientific Research) has just created its first industrial link: Midi-Robot. The Midi-Robot company will operate in three areas: robot control software, particularly for assembly operations, robot vision systems, and engineering of automated production systems. The company also intends to operate in a consulting capacity on production problems for other companies. It will later become involved in artificial intelligence and control systems. In the long run, the objective is to build up an array of products able to compete on the world market. B.W.

N84-34650# Joint Publications Research Service, Arlington, Va.
LAMBERTON ROBOTICS DEVELOPS NEW ROBOT TO HANDLE HEAVY LOADS c37
In its West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1984 p 42-43 Transl. into ENGLISH from Robots (Paris), Feb. 1983 p 8 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

A huge industrial robot, probably the largest of its kind, has just been installed at the Cameron steel mill in West Lothian, Scotland. It will handle very hot steel ingots weighting up to 700 kg. The robot, which can position ingots in a stamping press within a margin of error of + or - 0.75 mm, was perfected by Lamberton Robotics after a two-year development program aimed at the heavy sector of the robot market, and particularly at uses which exclude mobile robots because of the nature or weight of loads, the range required, or the difficult environmental condition involved, such as operation at high temperatures. The new robot will be able to accomplish tasks which up till now have been done by remote

control manipulators, which are extremely nimble, but which require the constant presence of an operator in order to function. By providing the manipulator with a computerized control system, Lamberton Robotics has transformed a system which needed an operator into a fully programmable industrial robot. B.W.

N84-34564# Joint Publications Research Service, Arlington, Va.
IMPROVING THE DESIGN OF MULTILAYER PIPES
In its USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 38-46 Transl. into ENGLISH from Stroitelstvo Truboprovodov (Moscow), no. 4, Apr. 1982 p 21-24 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N84-34651* National Aeronautics and Space Administration. Pasadena Office, Calif.
PIPELINED DIGITAL SAR AZIMUTH CORRELATOR USING HYBRID FFT-TRANSVERSAL FILTER Patent
Chialin Wu (JPL, California Inst. of Tech., Pasadena) and Kuang Y. Liu, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 11 Sep. 1984 22 p Filed 26 Oct. 1981 Supersedes N82-12298 (03 - 20, p 0326) Sponsored by NASA
(NASA-Case-NPO-15519-1; NAS 1.71:NPO-15519-1; US-Patent-4,471,357; US-Patent-Appl-SN-314928; US-Patent-Class-343-5-CM; US-Patent-Class-343-5-FT; US-Patent-Class-343-5-DP) Avail: US Patent and Trademark Office CSCL 17I

A synthetic aperture radar system (SAR) having a range correlator is provided with a hybrid azimuth correlator which utilizes a block-pipe-lined fast Fourier transform (FFT). The correlator has a predetermined FFT transform size with delay elements for delaying SAR range correlated data so as to embed in the Fourier transform operation a corner-turning function as the range correlated SAR data is converted from the time domain to a frequency domain. The azimuth correlator is comprised of a transversal filter to receive the SAR data in the frequency domain, a generator for range migration compensation and azimuth reference functions, and an azimuth reference multiplier for correlation of the SAR data. Following the transversal filter is a block-pipelined inverse FFT used to restore azimuth correlated data in the frequency domain to the time domain for imaging. R.S.F.

N84-34652 Department of the Navy, Washington, D. C.
STEPPED FREQUENCY RADAR TARGET IMAGING Patent
D. R. Wehner and M. J. Prickett, inventors (to Navy) Issued 22 May 1984 13 p
(AD-D011187; US-Patent-4,450,444; US-Patent-Appl-SN-268501-81; US-Patent-Class-343-5) Avail: US Patent and Trademark Office CSCL 17/9

An apparatus is disclosed by which radar targets can be imaged in two dimensions for identification at full radar range using relatively moderate speed data processing. Images of targets are found in range and cross-range dimensions from the time history of the targets' wide-band spectral response obtained by a frequency stepping radar. A frequency synthesizer generates a series of N identical signal bursts, each burst comprising n pulses and each of said n pulses being a different frequency. The radar echos from this series of bursts is separated into n-phase and quadrature phase components. These components are processed to calculate and store the relative amplitude of each echo signal relative to the phase of the corresponding transmitted pulse. GRA

N84-34653 Department of the Navy, Washington, D. C.
A 360-DEGREE SCANNING ANTENNA WITH CYLINDRICAL ARRAY OF SLOTTED WAVEGUIDES Patent
D. G. Bodnar and J. W. Cofer, Jr., inventors (to Navy) Issued 3 Jul. 1984 8 p Supersedes AD-D008600
(AD-D011189; US-Patent-4,458-250; US-Patent-Appl-SN-271056-81; US-Patent-Class-343-768) Avail: US Patent and Trademark Office CSCL 09/5

A 360 degree scanning antenna is disclosed which includes a mechanism for scanning the main beam of a cylindrical array in azimuth and over a limited angle in elevation in which a primary feedhorn illuminates a geodesic lens which in turn illuminates the cylindrical array structure. Energy is coupled from the parallel plate structure of the feedhorn assembly into the individual waveguides of the array via dielectric wedges extending from the waveguides. Scanning in elevation is accompanied by changing the transmitter frequency and in azimuth by rotating the primary feedhorn assembly. Author (GRA)

N84-34654 Department of the Navy, Washington, D. C.
CONFORMAL ARRAY COMPENSATING BEAMFORMER Patent
E. J. Sullivan, inventor (to Navy) 12 Jun. 1984 7 p Supersedes AD-D009779
(AD-D011198; US-Patent-4,454,597; US-Patent-Appl-SN-374207; US-Patent-Class-367-12) Avail: US Patent and Trademark Office CSCL 17/2

Document describes a narrow band compensating beamformer for a receiving array that conforms to some surface other than a plane and thus is, in general, three dimensional. The array comprises a number of sensing elements arranged in a non-planar pattern. Each sensing element has its output signal delayed or phase shifted as a function of the receiving angle by the beamformer in such a way as to produce an equivalent projected planar array in a particular direction. This arrangement has the same beam pattern in the selected direction as an equivalent planar array with its lower side lobe characteristics permitting the taking of advantage of well known, low side lobe shading techniques. GRA

N84-34655*# Georgia Inst. of Tech., Atlanta. Electromagnetics Lab.
RESEARCH IN MILLIMETER WAVE TECHNIQUES Semiannual Status Report, Jul. 1983 - Jul. 1984
R. E. Forsythe Aug. 1984 25 p refs
(Grant NsG-5012)
(NASA-CR-173964; NAS 1.26:173964) Avail: NTIS HC A02/MF A01 CSCL 20N

Work on the development of an improved 183 GHz subharmonic mixer was concentrated in two areas. First, there was an improved performance from current mixer body designs by testing different diodes and varying the whisker lengths. Second, there is the design of a new body structure. The whisker and diode pinsare in the same piece of the mixer that holds the substrate, reducing any motion of the parts that form the ohmic contacts of the diodes circuit. The broadband, low loss, quasi-optical diplexer, which is designed for use with a single ended mixer, has been developed. It uses a Gaussian beam waveguide as its transmission medium. The difference between the diplexer and other diplexers is the use of a Fabry Perot parallel plate filter. One is a multichannel radiometer system. Another approach is a quasi-optical RF polarization diplexer and another receiver. Some of the receivers developed were flown in aircraft and degraded considerably because of an LO failure. A technique for adding a 118 GHz channel to the existing Atmospheric Moisture Microwave Scanner radiometer system, using the RF diplexing scheme, is presented. S.B.

N84-34656# New Mexico Univ., Albuquerque. Dept. of Mathematics.
AN ANISOTROPIC LENS FOR LAUNCHING TEM WAVES ON A CONDUCTING CIRCULAR CONICAL SYSTEM
A. P. Stone and C. E. Baum Jun. 1984 84 p

(Grant AF-AFOSR-0040-83)
(AD-A144140; NOTE-285; AFOSR-84-0600TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

A differential impedance and transit-time matching approach is used in the design of an anisotropic lens for launching TEM waves from a small source, through the lens, and onto a conducting circular conical system. This approach leads to a system of ordinary differential equations which may be solved exactly to obtain the lens parameters. An approximate solution, which would be applicable to a design procedure, is also given. Author (GRA)

N84-34657# Range Commanders Council, White Sands Missile Range, N. Mex. Range Safety Group.
FLIGHT TERMINATION RECEIVER CATALOG
Jul. 1984 118 p Supersedes RSG-306-78
(AD-A144155; RSG-306-84; RSG-306-78) Avail: NTIS HC A06/MF A01 CSCL 17/2

This catalog provides reference information on ultrahigh-frequency flight termination receivers used at various U.S. missile ranges and test facilities. It is not intended to be a comprehensive review of all available flight termination receivers, and inclusion of hardware in this catalog does not constitute approval or endorsement for use at any government installation. Use of a specific receiver at a missile range or test facility requires the approval of the Commander of that installation. Approval for use of a particular receiver on a given missile at one installation does not constitute automatic approval for use of the same receiver on other missiles at the same installation or on the same missile at other installations. The information in this catalog has been extracted from manufacturers' specifications. It is provided as reference material only and is not intended as an endorsement of any model. GRA

N84-34658# Army Aeromedical Research Lab., Fort Rucker, Ala.
AUTOMATIC GAIN CONTROL CIRCUIT FOR VIDEO SIGNALS OF SCENES OF VARYING ILLUMINATION LEVELS
J. H. Hapgood and C. E. Rash Jul. 1984 13 p
(DA Proj. A3E-62777-A-879)
(AD-A144198; USAARL-84-9) Avail: NTIS HC A02/MF A01 CSCL 09/5

A type of automatic gain control circuit useful for enhancement of video signals of scenes of varying light illumination levels is described. A direct current voltage developed from the peak-to-peak input signal controls the effective gain of a video amplifier in a nonstandard method using a step-function control voltage.
Author (GRA)

N84-34659# Federal Aviation Administration, Washington, D.C.
OPERATIONAL REQUIREMENTS FOR THE REMOTE MAINTENANCE MONITORING SYSTEM (RMMS) National Airspace Systems Configuration Management Document
Jun. 1984 16 p
(AD-A144218; FAA-NAS-MD-792) Avail: NTIS HC A02/MF A01 CSCL 17/2

This operational requirements document was prepared for use in support of the development and implementation of a Remote Maintenance Monitoring System (RMMS) for the National Airspace System (NAS). Fundamental concepts of RMMS operation and the system description have been previously developed by the Airway Facilities Service (AAF). The information generated by the Remote Monitoring Subsystem (RMS) at the equipment site shall be directly available to the responsible maintenance personnel at their work center. Initially, a Maintenance Processor Subsystem (MPS) will be installed at the ARTCC where communication lines with enroute equipment and major airports presently exist. Future MPSs shall be located at sector offices, or major workcenters. The MPS shall monitor the status of all equipment for a specific geographical area and shall automatically notify the monitoring facilities of the equipment alarms. The monitoring facility shall be alerted of an alarm by both visual and aural signals describing where alarm has occurred, the type of alarm, and which equipment is alarming. The MPS shall serve as the primary collection point, processor, and distribution center for all RMM and Maintenance Management System (MMS) data. The RMMS will remote many routine maintenance functions currently performed at the remote equipment sites and will permit them to be accomplished at any suitably equipped work center. GRA

N84-34660# Stanford Univ., Calif. Labs. of Physics.
TEMPERATURE COMPENSATION OF SURFACE TRANSVERSE WAVES FOR STABLE OSCILLATOR APPLICATIONS Interim Report, Mar. 1983 - Mar. 1984
B. A. Auld Jun. 1984 25 p
(Contract F19628-83-K-0011)
(AD-A144245; RADC-TR-84-142) Avail: NTIS HC A02/MF A01 CSCL 20/14

This research is concerned with methods for achieving temperature compensation of surface-type acoustic wave resonators and delay lines in high coupling materials such as lithium niobate and lithium tantalate. Emphasis in placed on surface transverse waves that is horizontally polarized shear waves trapped on the surface by a grating structure consisting of grooves, mass loading strips, conducting strips, or combinations thereof. GRA

N84-34661# New Jersey Inst. of Tech., Newark.
DECISION RULES APPLIED TO SPREAD SPECTRUM SIGNAL DETECTION Technical Report, Jun. 1982 - Jun. 1983
R. J. Kim, S. Rosenstark, and J. Frank Ft. Monmouth, N.J. Army Communications-Electronics Command Jul. 1984 85 p
(Contract DAAG07-82-K-J156)
(AD-A144253; CECOM-TR-84-3) Avail: NTIS HC A05/MF A01 CSCL 09/3

Decision rules for detection of spread spectrum signals were investigated. For each decision rule, error and erasure probabilities were analyzed. The obtained data was used to plot P sub E vs. P sub E for constant signal-to-noise ratio (SNR). With the use of the probability-of-a-word-error curves the optimum threshold setting was found for a given SNR. Orthogonal signalling (FSK) and antipodal signalling (PSK) were considered for modulating the chips. When the P sub E vs. P sub E plots for FSK and PSK were compared, PSK performed better than FSK by a ratio of 6 dB. Finally, analog and digital correlation of the received signals was investigated. Compared to the performance of analog correlation, the system performance for digital correlation was worse by less than 1 dB. Author (GRA)

N84-34662# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE LINCOLN LABORATORY-AEROSPACE MEDICAL RESEARCH LABORATORY DIGITAL SPEECH TEST FACILITY
J. Tierney and H. Schecter (Electronic Systems Div., Hanscom AFB, Mass.) 25 May 1984 29 p
(Contract F19628-80-C-0002)
(AD-A144303; TR-683; ESD-TR-84-014) Avail: NTIS HC A03/MF A01 CSCL 17/2

A narrowband digital speech communication test facility has been established and operates between Lincoln Laboratory and the Wright-Patterson Aerospace Medical Research Laboratory. Noise fields simulating the acoustic environments of E3A and F-15 aircraft are established and Air Force personnel use the link operating at 2400 bps with a vocoder designed at Lincoln Laboratory, and a commercial telephone line modem. The facility includes a digital signal processing computer which can introduce bit errors and delay into the transmit and receive data. Communication scenarios are used to exercise the vocoder-modem channel with the dynamics and vocabulary of typical operational exchanges. Answers to a standard questionnaire provide acceptability data for the 2400 bps JTIDS class 2 voice channel. For the tests run so far, the 2400 bps voice is acceptable in the sense of positive user response to the questionnaire. Further testing using error and delay simulations will follow. An F-15 to F-15 link will be simulated at AMRL using a pair of vocoders operating back-to-back and in separate noise chambers. Author (GRA)

N84-34663# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Electromagnetic Pulse Environment.
EVALUATION OF METHODOLOGIES FOR ESTIMATING

VULNERABILITY TO ELECTROMAGNETIC PULSE EFFECTS
National Academy Press 1984 111 p
(Contract DNA001-82-C-0309)
(AD-A144408) Avail: NTIS HC A06/MF A01 CSCL 20/14

High-altitude electromagnetic pulse (EMP) is an electromagnetic radiation of very short rise time, large amplitude, and brief duration that follows a nuclear explosion above the atmosphere. The area over which a single EMP event is experienced can be very great if the explosion is high enough and large enough. Several such nuclear explosions might render unprotected electronic equipment and systems inoperative over an area as large as the continental United States. Damage may occur when high currents and voltages, driven by EMP, reach vital internal circuits. It is therefore essential to protect the systems and to form some idea of how well they will withstand EMP. GRA

N84-34664# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
THROUGHPUT FOR PACKET RADIO NETWORKS WITH DYNAMIC POWER LEVELS M.S. Thesis
J. N. Marcus Jul. 1984 116 p
(Contract N00014-75-C-1183; Grant NSF ECS-83-106; ARPA Order 3045)
(AD-A144415; LIDS-TH-1390) Avail: NTIS HC A06/MF A01 CSCL 17/2

A packet radio network consists of a set of computers whose intercommunication needs are served by mobile radios. In this work, relatively simple models are used to determine attainable throughputs in such networks under a variety of routing scheduling strategies. In particular, we assume uniform traffic requirements between all pairs of nodes and an idealized capture effect. Through the derivation and numerical solution of a differential equation, it is shown that a large network of nodes which are uniformly spaced along a line and which uses slotted-Aloha channel access can attain a throughput of 2.05/e if its transmitters can dynamically adjust their power, as opposed to a 1/e throughput attainable in fixed-power networks. GRA

N84-34665# Naval Research Lab., Washington, D. C.
ISOLATED-WORD SPEECH RECOGNITION USING MULTI-SECTION VECTOR QUANTIZATION CODE BOOKS Final Report
D. K. Burton, J. E. Shore, and J. T. Buck 13 Jul. 1984 48 p
(AD-A144433; NRL-MR-5367) Avail: NTIS HC A03/MF A01 CSCL 06/4

A new approach to isolated-word speech recognition using vector quantization (VQ) is examined. In this approach, words are recognized by means of sequences of VQ code books called multi-section code books. A separate multi-section code book is designed for each word in the recognition vocabulary by dividing the word into equal-length sections and designing a standard VQ code book for each section. Unknown words are classified by dividing them into corresponding sections, encoding them with the multi-section code books, and finding the multi-section code book that yields the smallest average distortion. For speaker-independent recognition of a 20-word vocabulary containing the digits, this approach achieves 95% recognition accuracy for the full vocabulary and 99% for the digits, in both causes with approximately 90% fewer distortion computations than typical dynamic-time-warping approaches. In addition, the approach achieves greater than 99% accuracy for speaker-dependent recognition of the digits with only 1 distortion computation per input frame per vocabulary word. The approach is described, detailed experimental results are presented and discussed, and computational requirements are analyzed. Author (GRA)

N84-34666# Texas Univ., Austin. Applied Research Lab.
NONLINEAR INTERACTION OF TWO NONCOLLINEAR SOUND WAVES IN A RECTANGULAR WAVEGUIDE
J. A. TenCate Jun. 1984 111 p
(Contract N00014-75-C-0867)
(AD-A144440; ARL-TR-84-16) Avail: NTIS HC A06/MF A01 CSCL 20/14

This report examines the nonlinear interaction (in air) of two noncollinear sound waves in a rectangular waveguide. One of the waves is a low frequency, finite-amplitude wave (pump) which travels in the (0,0) mode. The other is a high frequency, small-signal wave which travels in the (1,0) mode. A formula for the modulation, and accompanying suppression, of the small-signal wave by the pump is derived. The modulation depends on the angle of intersection, theta, of the two waves because: (1) only the velocity component u cos theta, of the pump convects the small-signal wave; and (2) the two waves have different group velocities (geometric dispersion). Experiments to examine both collinear and noncollinear interaction were performed in a 6.4 m long rectangular waveguide of inside cross-section 70 mm x 38 mm. Waveforms of the frequency modulated small-signal wave were recorded, the suppression of the small-signal primary was measured, and the cyclical variation (in space) of the sum and difference frequency wave amplitudes was examined. Theoretical predictions were generally confirmed. GRA

N84-34667# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF COHERENT DIGITAL RECEIVERS IN A JAMMING ENVIRONMENT M.S. Thesis
F. T. Farwell, Jr. Jun. 1984 95 p
(AD-A144441) Avail: NTIS HC A05/MF A01 CSCL 17/4

The effect of various jammer waveforms on known optimum coherent digital receivers is analyzed and evaluated in terms of receiver performance. The optimum jammer waveform for the specified receiver is derived and several jamming strategies are studied and compared to the optimum case. These jammer waveforms strategies include deterministic models of tonal, weighted signals, frequency modulated, and additive white noise jammers. An M-ARY digital coherent receiver using orthogonal modulation (FSK), is subjected to various jammer waveforms and the receiver performance analyzed. Graphical results based on numerical analyzes are presented to show the effects of jammer waveforms on receiver performance. Author (GRA)

N84-34668# City Coll. of the City Univ. of New York. Dept. of Electrical Engineering.
SPREAD SPECTRUM, ACQUISITION AND TRACKING Annual Technical Report, 1 Mar. 1983 - 29 Feb. 1984
D. L. Schilling Feb. 1984 58 p
(Grant AF-AFOSR-0102-83)
(AD-A144533; RF-447105; AFOSR-84-0704TR) Avail: NTIS HC A04/MF A01 CSCL 09/4

This report discusses the following subjects: a new rapid acquisition technique for direct sequence spread spectrum communications. The rapid acquisition technique described here can be used in direct sequence spread spectrum systems. The technique employs a double threshold which defines when a decision can be made. These thresholds change at each examination instant. Using this technique a significant reduction in the acquisition time of a direct sequence spread spectrum signal is obtained. A new double threshold acquisition scheme applied to the fading channel in frequency hopping spread spectrum. GRA

N84-34669# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MILLIMETER WAVE COMMUNICATIONS M.S. Thesis
S. E. Payne Jun. 1984 82 p
(AD-A144636; AFIT/GE/EE/84J-08) Avail: NTIS HC A05/MF A01 CSCL 17/2

This investigation establishes the maximum communication link, i.e., transmitter/receiver separation, available to a millimeter wave channel in a clear, non-turbulent atmosphere for a low-power, low data-rate system. The frequencies considered are from the oxygen resonant absorbtion band centered around 60 GHz for several altitudes to 20 kilometers. The effort is concerned with various modulation schemes for the transmission of digital data and their relative performance in the presence of a jammer. The analysis is accomplished by taking the Friis communication link equation and accounting for tropospheric absorbtion loss. A Pascal-coded algorithm is developed to assess the relative data

transmission performance of the various modulation techniques. The program was written general enough for the user to specify: the carrier frequency, attenuation factor, transmitter power, transmitting and receiving antenna gains, system bandwidth, particular modulation technique, set of range values of interest, jammer power, jammer's antenna gain, and jammer's location.
GRA

N84-34670# Army Construction Engineering Research Lab., Champaign, Ill.
THE EFFECT OF FLUIDS ON WAVEGUIDES BELOW CUTOFF PENETRATIONS AS RELATED TO ELECTROMAGNETIC SHIELDING EFFECTIVENESS Final Report
M. K. McInerney, S. Ray, R. McCormack, S. Castillo, and R. Mittra Jul. 1984 66 p
(Contract MIPR-82-577)
(AD-A144685; CERL-TR-M-354) Avail: NTIS HC A04/MF A01 CSCL 18/6

This study investigates the effect of fluid/loading on a waveguide below cutoff penetration through electromagnetic shields. The study addresses waveguide mode excitations, electromagnetic wave attenuation within the fluid-filled waveguide, and the effect of the waveguide on electromagnetic shielding effectiveness as measured by test procedures like those outlined in MIL-STD-285. Design curves are presented for commonly used pipe sizes and for some fluids that may be required to pass through electromagnetic shields. Results show expected changes in cutoff frequency due to variation in dielectric constant and response variations due to changes in loss tangent with frequency.
Author (GRA)

N84-34671# Department of the Air Force, Washington, D.C.
RANGE-ONLY MULTISTATIC RADAR SYSTEM Patent Application
Donald M. Montana, inventor (to Air Force) Filed 21 Apr. 1982 35 p
(AD-D011201; US-Patent-Appl-SN-370234) Avail: NTIS HC A03/MF A01 CSCL 17/9

A range-only multistatic radar system has a plurality of radar stations located in a square grid pattern. Each radar station has a plurality of low power pulsed transmitters and receivers that operate on omnidirection whip antennae. Echo information received by the receivers is transmitted to a computer wherein a technique is employed to deghost and identify real targets. The computer applies a range difference similarity test, a uniqueness test, and a position test to determine real targets from the plurality of echo returns received.
Author (GRA)

N84-34672# International Centre for Theoretical Physics, Trieste (Italy).
DISTORTIONS IN FREQUENCY SPECTRA OF SIGNALS ASSOCIATED WITH SAMPLING-PULSE SHAPES
Ernest C. Kjau (DaresSalaam Univ., Tanzania) Apr. 1983 26 p refs Submitted for publication
(DE84-701747; IC-83/37) Avail: NTIS HC A03/MF A01

A method developed earlier by the author is used to investigate distortions introduced into frequency spectra of signals by the shapes of the sampling pulses involved. Conditions are established under which the use of trapezoid or exponentially-edged pulses to digitize signals can make the frequency spectra of the resultant data samples devoid of the main features of the signals. This observation does not, however, apply in any way to cosinusoidally-edged pulses or to pulses with cosine-squared edges. Since parts of the Earth's surface and atmosphere receive direct solar energy in discrete samples (i.e., only from sunrise to sunset) we have extended the technique and attempted to develop a theory that explains the observed solar terrestrial relationships. A very good agreement is obtained between the theory and previous long-term and short-term observations.
Author

N84-34412# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
IN-FLIGHT ACCURACY AND COVERAGE TESTS OF ESM- AND ECM-SYSTEMS
Helmut Bothe and Kurt Klein *In* AGARD Flight Test Tech. Jul. 1984 9 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34635# Joint Publications Research Service, Arlington, Va.
DOMESTIC SATELLITE COMMUNICATION SYSTEM TO BE ESTABLISHED IN CHINA
Zong Ruhou and Bao Yucheng *In its* Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 7-10 refs Transl. into ENGLISH from Xiandai Tongxin (Shanghai), no. 10, 1983 p 8-9 (For primary document see N84-34634 24-31)
Avail: NTIS HC A02/MF A01

N84-34637# Joint Publications Research Service, Arlington, Va.
REVIEW OF WEST GERMANY'S DFS SATELLITE TELECOMMUNICATIONS PROGRAM
In its Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 60-63 refs Transl. into ENGLISH from Flug Rev. (Stuttgart), Dec. 1983 p 30-31 (For primary document see N84-34634 24-31)
Avail: NTIS HC A05/MF A01

N84-34718# Technische Univ., Vienna (Austria). Inst. fuer Nachrichtentechnik.
PROSPECTS OF LASER COMMUNICATIONS IN SPACE
Walter R. Leeb *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 11 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34723# European Space Research and Technology Center, Noordwijk (Netherlands).
INTERSATELLITE LINKS: REQUIREMENTS FOR FUTURE MISSIONS AND LIMITATIONS FROM SPACECRAFT RESOURCES
G. Mica *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34727# Communications Satellite Corp., Clarksburg, Md.
TECHNOLOGIES FOR INTERSATELLITE OPTICAL COMMUNICATIONS
Gerhard A. Koepf *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34728# Centre d'Etudes et de Recherches, Toulouse (France).
CHARACTERIZATION OF HIGH POWERED LASER DIODES
J.-P. Bouzinc, Y. Aubry, H. Isbert, and M. Plantee *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p In FRENCH Sponsored by CNES (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34732# Technische Univ., Vienna (Austria). Inst. fuer Nachrichtentechnik.
RECEIVER CONCEPTS FOR DATA TRANSMISSION AT 10 MICRONS
A. L. Scholtz, H. K. Philipp, and W. R. Leeb *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34733# Stuttgart Univ. (West Germany). Inst. for Navigation.
THE CONCEPT OF THE LOW INTERMEDIATE FREQUENCY TRANSLATION LOOP (LIFTL) AND ITS APPLICATION ON A CO2 LASER INTERSATELLITE DATA LINK SYSTEM
M. Wittig *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 5 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34738# Technische Univ., Munich (West Germany). Inst. fuer Astronomische und Physikalische Geodaesie.
CENTER OF MASS CORRECTION AND ITS CONFIDENCE FOR THE PRECISE ORBITAL POSITIONING SATELLITE (POPSAT)
Dieter Egger, Eberhard Achtermann (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany), and Ulrich Rupe (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p ref (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34790# Materials Research Labs., Melbourne (Australia).
MILLIMETRE WAVES: A PROBLEM FOR THE FUTURE
R. C. McLeary and B. C. H. Wendlandt *In its* Extract from Symp.: Countersurveillance 1983 May 1984 p 99-102 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N84-34673 Department of the Navy, Washington, D. C.
SLOTLINE REVERSE-PHASED HYBRID RING COUPLER Patent
J. Reindel, inventor (to Navy) 6 Dec. 1983 6 p Supersedes AD-D009235
(AD-D011182; US-Patent-4,419,635; US-Patent-Appl-SN-305231; US-Patent-Class-333-116) Avail: US Patent and Trademark Office CSCL 09/5

A slotline directional coupler is disclosed that introduces a 180 degree phase reversal in one of the arms of the coupler in order to isolate opposite ports of the coupler. One of the arms of the coupler is split and a quarter wave shorted slotline is added to each portion of the split coupler arm. The split coupler arm is bridged by a short conductive strap that, in a first embodiment, is grounded on both ends to the slotline ground plane or in a second embodiment, is extended to appear as though grounded. In the first embodiment, the conductive strap is separated from the ground plane by air. In the second embodiment the dielectric substrate of the coupler separates the strap from the ground plane. The conductive strap serves as a slotline-to-microstrip-to-slotline transition which introduces a 180 degree phase shift in a signal propagating through it. Author (GRA)

N84-34674 Department of the Navy, Washington, D. C.
METHOD AND APPARATUS FOR PRECISE MEASUREMENT OF LONG-TERM STABILITY OF PHOTODETECTORS Patent
S. A. Miller, inventor (to Navy) Issued 10 Jul. 1984 4 p Supersedes AD-D009009
(AD-D011190; US-Patent-4,459-547; US-Patent-Appl-SN-259786; US-Patent-Class-324-158R) Avail: US Patent and Trademark Office CSCL 17/8

A method and apparatus is disclosed for the measurement of the long-term stability of photodetectors. A fiber optic star coupler divides optical flux from a source of light into highly stable proportioned light outputs. Each of the photodetectors to be tested is connected to be irradiated by one of the star coupler light outputs. Each of at least one reference photodetectors having known stabilities is connected to one of the remaining outputs of the star coupler. Resulting outputs of the photodetectors to be tested are compared against the resulting output from the reference photodetector. Author (GRA)

N84-34675*# Illinois Univ., Urbana. Electromagnetic Communications Lab.
MONOLITHIC MICROWAVE INTEGRATED CIRCUIT DEVICES FOR ACTIVE ARRAY ANTENNAS Final Report, 21 May - 20 Aug. 1984
R. Mittra 20 Aug. 1984 36 p refs
(Grant NAG3-420)
(NASA-CR-173981; NAS 1.26:173981) Avail: NTIS HC A03/MF A01 CSCL 09C

Two different aspects of active antenna array design were investigated. The transition between monolithic microwave integrated circuits and rectangular waveguides was studied along with crosstalk in multiconductor transmission lines. The boundary value problem associated with a discontinuity in a microstrip line is formulated. This entailed, as a first step, the derivation of the propagating as well as evanescent modes of a microstrip line. The solution is derived to a simple discontinuity problem: change in width of the center strip. As for the multiconductor transmission line problem. A computer algorithm was developed for computing the crosstalk noise from the signal to the sense lines. The computation is based on the assumption that these lines are terminated in passive loads. R.S.F.

N84-34676# Armed Forces Radiobiology Research Inst., Bethesda, Md.
METHODS FOR USE OF THE SINGLE-ELECTRODE VOLTAGE CLAMP
T. C. Pellmar Jun. 1984 13 p
(AD-A144177; AFRRI-TR84-4) Avail: NTIS HC A02/MF A01 CSCL 09/1

In order to obtain reliable data with the single-electrode voltage clamp, proper controls and test procedures must be done. The switching frequency and duty cycle are set according to the requirements of the cells and the experiment. Electrodes are used only if they can follow the switching frequency chosen and can pass required amounts of current without rectification. In each cell, the clamping ability of the electrode is tested with a calibrator signal. GRA

N84-34677# Kentucky Univ., Lexington.
HARMONIC CONTROL TO REDUCE TORQUE PULSATIONS IN BRUSHLESS dc MOTOR DRIVES Final Report, May 1983 - Jan. 1984
J. J. Cathey Mar. 1984 145 p
(Grant AF-AFOSR-0189-83)
(AD-A144216; AFOSR-84-0607TR) Avail: NTIS HC A07/MF A01 CSCL 20/3

The brushless direct current (dc) machine theoretically offers wide speed range torque characteristics like unto the commutator dc machine. However, in brushless dc motor drive systems there exists a performance deficiency in that at near zero speeds driven mechanical loads can respond to the pulsating component of developed torque when simple rotor position-activated switching is utilized. This report analytically develops a pulse width modulation control philosophy that reduces torque pulsations to an acceptable level. Author (GRA)

N84-34678# Naval Weapons Support Center, Crane, Ind. Weapons Quality Engineering Center.
EVALUATION OF AIRCRAFT BATTERY CHARGE, DISCHARGE, AND ANALYZATION REQUIREMENTS FOR GROUND SUPPORT EQUIPMENT Final Report, Apr. 1982 - Nov. 1983
T. E. OHaver 27 Jul. 1984 93 p
(AD-A144243; WQEC/C-83-423; NAEC-92-184) Avail: NTIS HC A05/MF A01 CSCL 10/3

This report provides an up-to-date listing of all aircraft batteries that are presently being used as well as those that will be used in the future. Test results and associated recommendations pertaining to the servicing requirements and associated charge, discharge, and analyzation equipment are delineated. Vented lead acid battery charging equipment performs satisfactorily and should continue to be utilized until these batteries are phased out by sealed lead acid batteries. GRA

N84-34679# Paris VI Univ. (France).
SOLID STATE BATTERIES, LITERATURE SURVEY, ANALYSIS

OF PERTINENT RESULTS AND PROSPECTIVE FOR FURTHER RESEARCH Final Report, Jan. - Dec. 1983
M. Balkanski and J. Hammerberg Dec. 1983 66 p
(Contract DAJA45-83-C-0025; DA Proj. IT1-61102-BH-57)
(AD-A144252) Avail: NTIS HC A04/MF A01 CSCL 10/3

This report contains a literature survey on Solid State Batteries up to December 1983. The main emphasis is on solid state electrolytes. A prospective discussion is carried on Interfacial properties, Thin Films and Size Effects. GRA

N84-34680# Georgia Inst. of Tech., Atlanta. School of Electrical Engineering.
TWO-DIMENSIONAL SIGNAL PROCESSING AND STORAGE AND THEORY AND APPLICATIONS OF ELECTROMAGNETIC MEASUREMENTS Final Report, 1 Apr. 1981 - 31 Mar. 1984
R. W. Schafer and D. T. Paris Jun. 1984 45 p
(Contract DAAG29-81-K-0024)
(AD-A144266; AD-E401208) Avail: NTIS HC A03/MF A01 CSCL 09/1

This is a final report on research conducted under the auspices of the Joint Services Electronics Program. Specific topics covered are: digital signal processing, parallel processing architecture, two-dimensional optical storage and processing, hybrid optical/digital signal processing, electromagnetic measurements in the time domain, and automatic radiation measurements for near-field and far-field transformations. Author (GRA)

N84-34681# Lincoln Lab., Mass. Inst. of Tech., Lexington.
VLSI (VERY LARGE SCALE INTEGRATED) SELF-TESTING USING EXHAUSTIVE BIT PATTERNS
B. L. Dervisoglu 31 May 1984 36 p
(Contract F19628-80-C-0002; ARPA Order 3797; AF Proj. 4D30)
(AD-A144299; TR-685; ESD-TR-84-019) Avail: NTIS HC A03/MF A01 CSCL 09/5

The use of Linear Feedback Shift Register functions in generating exhaustive test case coverage for Very Large Scale Integrated circuits with SCAN/SET capability is presented. Both deterministic and probabilistic approaches to test pattern generation are discussed. A technique for signature generation is presented with analysis of its effectiveness. Also, a technique is described for consolidating the test patttern generation and signature capture functions into a single test/detect capability that requires less built-in hardware for implementation. Author (GRA)

N84-34682# Naval Air Engineering Center, Lakehurst, N.J. Ship and Shore Inst. Engineering Dept.
CAPACITY SELECTOR VALVE ELECTRONICS ENCLOSURE ASSEMBLY CONTROLLER CARD ASSEMBLY TEST SPECIFICATIONS: REVISION Final Report
T. Olszewski 12 Jul. 1984 100 p Supersedes AD-A139792
(AD-A144349; NAEC-ENG-91-7999-REV-B) Avail: NTIS HC A05/MF A01 CSCL 09/1

This document is a test procedures for the printed circuit board in the electronic enclosure assembly of the capacity selector valve system. The tests are intended to be only functional screening tests for the assembled boards. Author (GRA)

N84-34683# Stanford Univ., Calif. Information Systems Lab.
A NEW ADAPTIVE ANTENNA SYSTEM FOR COHERENT SIGNALS AND INTERFERENCE
T. J. Shan and T. Kailath Oct. 1983 6 p Presented at the 17th Asilomar Conf., Oct. 1983
(Contracts F49620-79-C-0058; DAAG29-79-C-0215; DAAG29-81-K-0057; Grant AF-AFOSR-0228-83)
(AD-A144355; AFOSR-84-0488TR) Avail: NTIS HC A02/MF A01 CSCL 09/5

In this paper the authors introduce a new adaptive antenna system able to work well even when the desired signal and the interference are coherent. The present adaptive beamformers fail to operate in these cases. The results of simulations appear to confirm the theoretical predictions. Author (GRA)

N84-34684# Stanford Univ., Calif. Electronics Lab.
JOINT SERVICES ELECTRONICS PROGRAM Final Technical Report, Apr. 1981 - Mar. 1983
S. F. Lundstrom Jun. 1984 18 p
(Contract DAAG29-81-K-0057)
(AD-A144444; SU-FTR-84-0057-1) Avail: NTIS HC A02/MF A01 CSCL 09/5

This is the final report of the research conducted at the Standford Electronics Laboratories under the sponsorship of the Joint Services Electronics Program from April 1981 through March 1984. This report summarizes the areas of research, identifies the most significant results, and lists the dissertations and publications sponsored by the contract (DAAG29-81-K-0057). Author (GRA)

N84-34685# Stanford Univ., Calif. Electronics Lab.
JOINT SERVICES ELECTRONICS PROGRAM Annual Report, Apr. 1983 - Mar. 1984
S. F. Lundstrom Jun. 1984 93 p
(Contract DAAG29-81-K-0057)
(AD-A144445; Rept-3) Avail: NTIS HC A05/MF A01 CSCL 09/5

This report describes work performed under the Joint Services Electronics Program, sponsored by the Departments of the Air Force (Air Force Office of Scientific Research), Army (Army Research Office), and Navy (Office of Naval Research), under contract DAAG29-81-K-0057 at the Stanford Electronics Laboratories, Stanford University, Stanford, California. GRA

N84-34686# Army Construction Engineering Research Lab., Champaign, Ill.
INVESTIGATION OF POWER FACTOR CONTROLLER APPLICATIONS Final Report
M. B. Chionis and B. J. Sliwinski Jul. 1984 68 p
(DA Proj. 4A1-62781-AT-45)
(AD-A144466; CERL-TR-E-196) Avail: NTIS HC A04/MF A01 CSCL 10/2

This study was conducted to evaluate the power factor controller (PFC) as a potential energy conservation device for Army applications and to develop guidelines for its use. An examination of studies conducted on the PFC showed that it can be an effective energy conservation device when properly applied, cutting motor energy consumption by at least 10 percent on low-efficiency motors. However, the use of high efficiency motors is almost always more energy conservative, and PFCs do not improve the performance of motors whose efficiency is already high over the load range. GRA

N84-34687# Columbia Univ., New York. Dept. of Electrical Engineering.
DIRECT WRITING OF MICROSTRUCTURES FOR MICROELECTRONICS Final Report, 1 Jan. 1981 - 31 Dec. 1983
R. M. Osgood, Jr. 9 Jul. 1984 89 p
(Contract F49620-82-K-0008; ARPA Order 4487; AF Proj. 231)
(AD-A144528; AFOSR-84-0635TR) Avail: NTIS HC A05/MF A01 CSCL 09/5

A program to investigate direct laser writing for semiconductor processing is described. In this program the following results were obtained: The first reported fabrication of submicrometer diffraction gratings in GaAS; Development of a new technique for writing patterns of the dielectric material, SiO2; Measurement of the conductivity and properties of metal interconnects; The first demonstration of laser-enhanced plasma etching; and The first observation of deep-UV enhanced liquid etching of GaAS. GRA

N84-34688# Honeywell Systems and Research Center Minneapolis, Minn.
HIERARCHICAL MULTISENSOR IMAGE UNDERSTANDING Annual Report, Oct. 1983 - Sep. 84, Interim Report, 1 Jul. 1983 - 30 Jun. 1984
R. K. Aggarwal Jul. 1984 66 p Original contains color illustrations
(Contract F49620-83-C-0134)
(AD-A144593; AFOSR-84-0639TR) Avail: NTIS

HC A04/MF A01 CSCL 09/4

This report describes the research results on Honeywell's Hierarchical Multisensor Image Understanding program. Honeywell is developing a unified framework for the different hierarchical levels of image processing such as segmentation, detection, classification, and identification of outdoor scenes and across different sensor modalities such as millimeter wave, infrared, and visible. Current activities on the project are reviewed under the following headings: (1) artificial-intelligence-based generic image segmentation and object recognition; (2) evidence-confidence paradigms for image understanding; (3) hierarchical systems theory for control structures; and (4) invariant methods in image understanding. Also discussed are scene analysis and attributed graphs. GRA

N84-34689# Department of the Air Force, Washington, D.C.
MICROWAVE DISCHARGE APPARATUS AND METHOD WITH DUAL FUNCTION PRIMING RESONATOR Patent Application
Harry Goldie, inventor (to Air Force) Filed 18 Apr. 1984 20 p
(AD-D011202; US-Patent-Appl-SN-601515) Avail: NTIS HC A02/MF A01 CSCL 09/1

The invention provides a novel microwave device of the gas tube variety which is compatible with integrated circuit techniques. The device, which may be a limiter, is primed into a low threshold condition by externally supplied microwave radio frequency energy using a single resonator circuit. The priming arrangement also has improved stability characteristics. Author (GRA)

N84-34690# Department of Energy, Washington, D. C.
METHOD AND APPARATUS FOR ENHANCING MICROCHANNEL PLATE DATA Patent Application
Robert S. Thoe, inventor (to DOE) Filed 24 Oct. 1983 24 p
(Contract W-7405-eng-48)
(DE84-014498; US-Patent-Appl-SN-544930) Avail: NTIS HC A02/MF A01

A method and apparatus for determining centroid channel locations are disclosed for use in a system activated by one or more multichannel plates and including a linear diode array providing channels of information 1, 2, ...,n, ... N containing signal amplitudes A sub n. A source of analog A sub n signals, and a source of digital clock signals n, are provided. Non-zero A sub n values are detected in a discriminator. A digtial signal representing p, the value of n immediately preceding that whereat A sub n takes its first non-zero value, is generated in a scaler. The analog A sub n signals are converted to digital in an analog to digital converter. The digital A sub n signals are added to produce a digital (SIGMA) A sub n signal in a full adder. Digital 1, 2, ..., m signals representing the number of non-zero A sub n are produced by a discriminator pulse counter. Digital signals representing 1 A sub p+1, 2 A sub p+2, ..., m A sub p+m are produced by pairwise multiplication in multiplier. These signal are added in multiplier summer to produce a digital (SIGMA)nA sub n - p(SIGMA)A sub n signal. This signal is divided by the digital (SIGMA) A sub n signal in a divider to provide a digital (SIGMA)nA sub n /(SIGMA)A sub n) -p signal. Finally, this last signal is added to the digital p signal in an offset summer to provide (SIGMA)nA sub n /(SIGMA)A sub n, the centroid channel locations. DOE

N84-34636# Joint Publications Research Service, Arlington, Va.
NEW MARKETS FOR INTEGRATED CIRCUITS FIRMS IN UK, FRANCE AND WEST GERMANY
In its Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 51-53 refs Transl. into ENGLISH from Electron. Actualities (Paris), 11 Nov. 1983 p 46 (For primary document see N84-34684 24-31)
Avail: NTIS HC A05/MF A01

N84-35063# National Science Council, Taipei (Taiwan).
THE RESEARCH AND FABRICATION OF ELECTRONIC MATERIALS AND THE ESTABLISHMENT OF CHARACTERIZATION CENTER OF ELECTRONIC MATERIALS Abstract Only
Kuo-lan Ni (ITRI) *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 498 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-34686# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF MICROELECTRONICS DESCRIBED
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-027) 26 Jul. 1984 p 31-38 Transl. into ENGLISH from Elektron. (Warsaw), no. 2, Feb. 1984 p 31-33 (For primary document see N84-34963 24-60)
Avail: NTIS HC A03/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N84-34691# Chalmers Univ. of Technology, Goteborg (Sweden). Inst. fuer Energiteknik.
ON NUMERICAL METHODS IN NON-NEWTONIAN FLOWS
G. Fileas Dec. 1982 133 p refs
(DE84-701276; CTH-R-82/07; ISSN-0280-7572) Avail: NTIS HC A07/MF A01

The constitutive equations for non-Newtonian flows are presented and the various flow models derived from continuum mechanics and molecular theories are considered and evaluated. Detailed account is given of numerical simulation employing differential and integral models of different kinds of non-Newtonian flows using finite difference and finite element techniques. Procedures for computer set ups are described and references are given for finite difference, finite element and molecular theory based programs for several kinds of flow. Achievements and unreached goals in the field of numerical simulation of non-Newtonian flows are discussed and the lack of numerical work in the fields of suspension flows and heat transfer is pointed out. Finally, FFOCUS is presented as a newly built computer program which can simulate freezing flows of Newtonian fluids through various geometries and is aimed to be further developed to handle non-Newtonian freezing flows and certain types of suspension phenomena involved in corium flow after a hypothetical core melt down accident in a pressurized water reactor. Author

N84-34692*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
IMPROVED MONOGROOVE HEAT PIPE DESIGN: INSULATED LIQUID CHANNEL WITH BRIDGING WICK Patent Application
Joseph P. Alario (Grumman Aerospace Corp., Bethpage, N.Y.), Richard F. Brown (Grumman Aerospace Corp., Bethpage, N.Y.), and Robert Kosson, inventors (to NASA) (Grumman Aerospace Corp., Bethpage, N.Y.) Filed 30 May 1984 14 p
(NASA-Case-MSC-20497-1; NAS 1.71:MSC-20497-1; US-Patent-Appl-SN-615505) Avail: NTIS HC A02/MF A01 CSCL 20D

A screen mesh artery supported concentrically within the evaporator section of a heat pipe liquid channel retains liquid in the channel and assures continued and uniform liquid feed to the heat pipe evaporation section during periods of excessive heat transfer. NASA

N84-34693*# National Aeronautics and Space Administration, Washington, D. C.
HEAT TRANSFER CHARACTERISTICS OF REGENERATOR MATRIX (CASE OF PACKED WIRE GAUZES)
K. Hamaguchi, S. Takahashi, and H. Miyabe May 1984 31 p refs Transl. into ENGLISH from Nihon Kikai Gakkai Ronbunshu, Series B (Japan), no. 49-445, 1983-1984 p 2001-2010 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77448; NAS 1.15:77448) Avail: NTIS HC A03/MF A01 CSCL 20D

The average heat transfer coefficient in the matrix of laminated

wire screens (10 to 250 mesh) for a Stirling engine heat exchanger was studied experimentally. The data are correlated by N sub ud = 0.42 R sub ed 0.56 (3 < or = R sub ed < or = 400), and R sub ed are the Nusselt and Reynolds nubmers based on the wire diameter. The pressure drop decreased and the heat transfer increased as the wire diameter was decreased. R.S.F.

N84-34694*# National Aeronautics and Space Administration, Washington, D. C.
CONTRIBUTION TO THE PERFORMANCE OF MICROJETS Ph.D. Thesis - Technical Univ., Feb. 1983
Dieter Hayn Sep. 1984 155 p refs Transl. into ENGLISH of German Thesis Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77730; NAS 1.15:77730) Avail: NTIS HC A08/MF A01 CSCL 20D

Theoretical investigations are made on the performance of microjets. A description is given of experiments with micropropulsion units to correlate the results obtained in the first part of the report. Execution of performance measurements is discussed, and error calculations are presented. Author

N84-34695*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THREE-DIMENSIONAL LASER DOPPLER ANEMOMETER MEASUREMENTS OF A JET IN A CROSSFLOW
Philip Snyder and Kenneth L. Orloff Sep. 1984 229 p refs
(NASA-TM-85997; A-9639; NAS 1.15:85997) Avail: NTIS HC A11/MF A01 CSCL 20D

A three-dimensional laser Doppler anemometer (3D-LDA) was used in a wind tunnel to measure a jet in a crossflow. Measurements were made in the vicinity of a 5-cm-diam jet which issued normally into a 10.65 m/sec wind tunnel crossflow; the velocity ratio Vjet/Vinf was 8. Detailed lateral surveys were made at two elevations (z = cm and 2 cm); both elevations were within the region affected by the boundary layer on the plate. The results are believed to provide reliable velocity field information in the boundary layer of the jet in a crossflow. Turbulence information also is available and believed to be roughly correct, although it may be subject to broadening effects for the lower values of turbulence. A weak vortex pair was observed in the wake at the plate surface. This structure existed in the boundary layer and built confidence because the 3D-LDA was, indeed, able to resolve fine detail in the wake. The capabilities of the 3D-LDA not only allow the making of the velocity surveys, but can be utilized to follow mean streamlines in the flow. Author

N84-34696# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
MODELING TWO-DIMENSIONAL FREEZING USING TRANSFINITE MAPPINGS AND A MOVING-MESH FINITE ELEMENT TECHNIQUE
M. R. Albert May 1984 55 p
(AD-A144131; CRREL-84-10) Avail: NTIS HC A04/MF A01 CSCL 12/1

Freezing phase change problems in conduction heat transfer represent a set of moving boundary problems for which much interest currently exists. In the work presented here, two-dimensional freezing is modeled by incorporating the use of transfinite mappings with a moving-mesh finite element technique. The use of transfinite mapping in a governing interior mesh motion is shown to provide very acceptable results and is demonstrated to be the most efficient general computational technique used to date. The model developed is capable of using either Cartesian or cylindrical coordinates. Both frozen and unfrozen phases may be modeled when conduction governs behavior in both. In the case of freezing of a fluid as it flows through a pipe the usefulness of always having the phase boundary coincident with element boundaries is demonstrated. Results of the model are shown to compare well with analytical and experimental results. A von Neumann stability analysis is performed for the numerical solution and tends to support the observation that the occurrence of a high Peclet number in the moving-mesh model of heat conduction may produce distortions of the numerical solution. Author (GRA)

N84-34697# California Inst. of Tech., Pasadena. Graduate Aeronautical Labs.
THE EFFECTS OF CURVATURE ON TURBULENT MIXING LAYERS
C. Wang 1984 184 p
(Contract N00014-76-C-0260)
(AD-A144250) Avail: NTIS HC A09/MF A01 CSCL 20/4

Experimental studies have been conducted in a curved mixing layer in which both the velocity ratio and the density ratio were variable. Flow visualization studies and profile measurements covered a wide range of experimental conditions. The structures observed experimentally were examined in the light of three different instability mechanisms which can exist in the same mean flow. For the case of mixing layers with uniform density, it was found that the normal large spanwise vortex structures can be weakened or inhibited by Taylor-Goertler instability if the inner stream is faster than the outer stream. For the case of mixing layers with different densities, three-dimensionality is greatly enhanced by Rayleigh-Taylor instability if the inner stream is heavier than the outer stream, and especially if the inner stream is also faster. In the former case the growth rate of the mixing layer was found to be insensitive to changes in the velocity ratio. The effects of curvature on the structure of the curved turbulent mixing layer were explored in terms of length scales and celerity for the large spanwise structures where these structures could be observed. Other things being equal, the celerity of the large structures was found to depend on density ratio and velocity ratio but not on the sense of the mean streamline curvature.
Author (GRA)

N84-34698# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
TURBULENT BOUNDARY LAYERS DEVELOPING OVER COMPLIANT SURFACES Final Report, 15 May 1983 - 15 May 1984
S. G. Lekoudis Jul. 1984 23 p
(Contract N00014-83-K-0418)
(AD-A144268; AD-E401208) Avail: NTIS HC A02/MF A01 CSCL 20/4

The flow examined is the two-dimensional turbulent boundary layer over sinusoidal wavy surfaces. The surfaces executed prescribed motion, that of a progressive water-wave. The main conclusions are: The pressure dominates the small skin friction reduction that occurs. At wavespeeds about 7/10 times the freestream speed and higher, the pressure becomes thrust producing for the case of two-dimensional waves. When the waves are swept, the pressure becomes thrust producing as wavespeeds approach the component of the freestream in the direction normal to the wavefront. Therefore the larger the sweep, the smaller the wavespeeds at which the pressure produces thrust. Because of lack of flexible wall experiments, with well defined motion of the sinusoidal wall and high wavespeeds, comparisons were made with water-wave experiments. Reasonable agreement was obtained for measured quantities inside the boundary layer. It was estimated that drag reduction, for the cases considered, is small. Limited comparison with available experiments indicates that the computed trends in the physical quantities are correct. Computations using other approaches and pressure measurements on wavy walls with well defined motion are needed, in order to examine if the turbulence model used in this study is adequate for detailed quantitative predictions. Based on the results of this study, a practical working system with a drag reducing surface with progressive waves does not seem feasible. GRA

N84-34699# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
A STUDY OF POLLUTANT DISPERSAL IN A 2-DIMENSIONAL FIELD INCLUDING GRAVITY EFFECTS Final Scientific Report, 30 Apr. 1983 - 29 Apr. 1984
S. T. Brown 28 Jun. 1984 65 p
(Grant AF-AFOSR-0146-83)

(AD-A144295; VKI-IN-77; EOARD-TR-84-20) Avail: NTIS HC A04/MF A01 CSCL 20/4

The effect of gravity forces on turbulent development is investigated both experimentally and numerically. In the experimental investigation, helium gas is released into an air stream. The experiment is carried out in a low speed, low turbulence wind tunnel. The He is released through an area source. Two configurations are investigated: He released from the top of the section and He released from the bottom of the section. Three different free stream turbulence levels are investigated at two free stream velocities. Numerically, the conservation of mass equation, written for a system of two species, is solved. The turbulent diffusion terms are modelled with a gradient flux model, constant coefficient of diffusivity. Comparisons are made with the experimental data, comparing effects of changing turbulent intensity, free stream velocity and buoyancy. Author (GRA)

N84-34700# Admiralty Marine Technology Establishment, Teddington (England).

FLUID LAYER BETWEEN INFINITE ELASTIC PLATES. I: MATHEMATICS AND INTENSITY VECTORS

J. H. James Feb. 1984 21 p

(AD-A144373; AMTE(N)/TM-84053; DRIC-BR-92250) Avail: NTIS HC A02/MF A01 CSCL 20/4

The pressure and displacements, due to line-force and line-source excitation, are given in terms of Fourier integrals which can be evaluated numerically. Plots of intensity vectors provide a vivid illustration of the energy flow in the fluid. The selected plots show significant interchange of propagating energy between fluid and the driven plate when the excitation is a force, but not when the excitation is a source. Author (GRA)

N84-34701# Stanford Univ., Calif. Center for Large Scale Scientific Computation.

HIGH MARANGONI NUMBER CONVECTION IN A SQUARE CAVITY: ADDITIONAL RESULTS

A. Zebib, G. M. Homsy, and E. Meiburg Jul. 1984 18 p Prepared in cooperation with Rutgers Univ., New Brunswick, N.J.

(Contract N00014-82-K-0335)

(AD-A144485; AD-E301449) Avail: NTIS HC A02/MF A01 CSCL 20/4

This manuscript is a companion document to the paper High Marangoni number convection in a square cavity, by the present authors which, at the time of this writing, is submitted for publication in the Journal of Fluid Mechanics. Thus it should only be read in conjunction with the above mentioned paper. Complete listing of our computational results is provided in Table 1. Figures 1 through 5 show the variation with y of the temperature and u-velocity at the plane x = O are presented. GRA

N84-34702# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE CALCULATION OF THE AXISYMMETRICAL SUBSONIC VISCOUS FLOW FIELD OF ANNULAR DIFFUSERS WITH PRE-WHIRLING CURRENT AT THE INLETS

J. Wang and Z. Ling 30 Jul. 1984 9 p Transl. into ENGLISH from Gongcheng Requli Xuebao (China), v. 4, no. 4, Nov. 1983 p 374-376

(AD-A144534; FTD-ID(RS)T-0742-84) Avail: NTIS HC A02/MF A01 CSCL 21/5

The calculation of this class of diffusers was solved. From the momentum e.g., in the circumferential direction it is proven that the angular momentum component rC, is constant along the streamline. By using this momentum eq. directly to the streamline iteration procedure for solving the main flow the difficulty that the stream surface should be correctly given in advance as done in the positive S sub 2 stream surface problem is overcome. The difference equs. of the quasi three dimensional B. L. equs. was obtained and solved by the three dimensional eddy viscosity model established by ceberi, T. and the simple elimination of the other column elements with the main column element. The separation condition and the calculation of a class of energy dissipation coefficient for design of high performance diffusers is presented. Author

N84-34703# Scientific Research Associates, Inc., Glastonbury, Conn.

DEVELOPMENT OF A DESIGN-ORIENTED NAVIER-STOKES CASCADE ANALYSIS Final Report, Sep. 1983 - Mar. 1984

S. J. Shamroth and H. McDonald Wright-Patterson AFB, Ohio AFWAL Jun. 1984 45 p

(Contract F33615-83-C-2370)

(AD-A144594; SRA-910006F; AFWAL-TR-84-2036) Avail: NTIS HC A03/MF A01 CSCL 20/4

Under a Phase I SBIR effort, an existing Navier-Stokes cascade computer code has been automated and recoded to form a design oriented cascade calculation procedure. The procedure consists of two distinct codes which are: (1) the coordinate generation code; and (2) the Navier-Stokes solver. With the revised procedure, the coordinate generator allows a new user to obtain coordinate systems with a minimum of input data. The Navier-Stokes procedure has been recoded to minimize required input and to decrease run time per time step. In addition, a run protocal has been developed to obtain rapid convergence. A demonstration calculation has been run which yields a converged solution in less than 300 CPU secs of unvectorized CRAY-1 run time. Author (GRA)

N84-34704# Wisconsin Univ., Madison. Mathematics Research Center.

NUMERICAL SOLUTIONS FOR CAVITATING FLOW OF A FLUID WITH SURFACE TENSION PAST A CURVED OBSTACLE Technical Summary Report

J. M. VandenBroeck Jul. 1984 21 p

(Contract DAAG29-80-C-0041; Grant NSF MCS-82-15064)

(AD-A144695; MRC-TSR-2712) Avail: NTIS HC A02/MF A01 CSCL 20/4

The problem of cavitating flow past a two-dimensional curved obstacle is considered. Surface tension is included in the dynamic boundary condition. The problem is solved numerically by series truncation. Explicit solutions are presented for the flow past a circle. It is shown that for each value of the surface tension different from zero, there exists a unique solution which leaves the obstacle tangentially. As the surface tension approaches zero, this solution tends to the classical solution satisfying the Brillouin - Villat condition. Vander-Broeck considered the effect of surface tension on the cavitating flow past a flat plate and on the shape of a jet emerging from a reservoir. His results indicate that the velocity is infinite at the separation points. It is shown that these unbounded values of the velocity are removed when the thickness and finite curvature of the ends of the plate and of the ends of the walls of the reservoir are taken into account. GRA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N84-34705* National Aeronautics and Space Administration. Pasadena Office, Calif.

CORRELATION SPECTROMETER HAVING HIGH RESOLUTION AND MULTIPLEXING CAPABILITY Patent

Jack S. Margolis (JPL, California Inst. of Tech., Pasadena) and John V. Martonchik, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 2 Oct. 1984 8 p Filed 30 Apr. 1982 Supersedes N82-26636 (17 - 20, p 2405) Sponsored by NASA

(NASA-Case-NPO-15558-1; NAS 1.71:NPO-15558-1; US-Patent-4,474,471; US-Patent-Appl-SN-373770;

US-Patent-Class-356-434; US-Patent-Class-250-343; US-Patent-Class-250-351; US-Patent-Class-356-51) Avail: US Patent and Trademark Office CSCL 14B

A correlation spectrometer permanently incorporates a reference cell and an electro-optical phase modulator (EOPM) in the light path between a sample cell and a detector. The effect of the EOPM is such that its frequency modulates all of the monochromatic component of the incoherent radiation passing through it. The EOPM is adjusted so that when it is ON all of the energy in the monochromatic components is thrown into sidebands differing from the original frequencies by integral multiples of the modulation frequency with the total amount of energy absorbed from the original radiation remaining constant. When there is no coincidence between the constituents in the two cells, the detector's output is the same when the EOPM is ON and when it is OFF. However, when there is coincidence the detector's output changes when the EOPM is switched between its two states. The change in the detector's output is related to the quantity of the constituents in the sample cell.

Official Gazette of the U.S. Patent and Trademark Office

N84-34706 Department of the Navy, Washington, D. C.
FIBER OPTIC ROTATION-SENSING GYROSCOPE WITH (3X2) COUPLER Patent
W. K. Burns, inventor (to Navy) Issued 1 May 1984 8 p Supersedes AD-D010316
(AD-D011195; US-Patent-4,445,780; US-Patent-Appl-SN-353677; US-Patent-Class-356-350) Avail: US Patent and Trademark Office CSCL 20/6

A Sagnac gyroscope, for measuring rotation rates, having an optical coupler, adapted for fabrication by integrated optical techniques, which is compact and provides for operation of the gyroscope at quadrature for small rotation rates. The optical coupler is a symmetrical, channel waveguide structure comprising a two-mode central waveguide branching into three one-mode input waveguides at one end and into two one-mode output waveguides at the other end. The output waveguides are optically coupled to the ends of a fiber-optic loop which provides a closed path in which the Sagnac phase shift is produced. The middle input waveguide is adapted to transmit an incident beam into the optical coupler while the outer input waveguides are adapted to transmit the output beams of the Sagnac gyroscope to a circuit for measuring and comparing the intensities of the beams in the outer waveguides so that the rotation rate may be determined.

Author (GRA)

N84-34707 Department of the Air Force, Washington, D.C.
METHOD FOR DYNAMICALLY RECORDING DISTORTION IN A TRANSPARENCY Patent
H. L. Task and L. V. Genco, inventors (to Air Force) Issued 24 Jul. 1984 6 p
(AD-D011209; US-Patent-4,461,570; US-Patent-Appl-SN-386488; US-Patent-Class-356-239) Avail: US Patent and Trademark Office CSCL 14/5

A method for dynamically recording distortion in a transparency includes a support fixture for mounting the transparency for movement about a predetermined horizontal or vertical axis, with a camera disposed in back of the transparency while a test target is disposed in front of it. The test target has a plurality of small light sources arranged in a rectangular matrix pattern toward which the camera is aimed through the transparency. By opening the camera shutter for a period of time as the transparency is moved through a predetermined angle, a photographic record of distortion at a plurality of regions in the transparency is produced.

Author (GRA)

N84-34708*# Aerojet Electrosystems Co., Azusa, Calif.
CONCEPTUAL DESIGN OF A HYBRID Ge:Ga
Christopher M. Parry Jul. 1984 136 p refs
(Contract NAS2-10740)
(NASA-CR-166605; NAS 1.26:166605; Rept-6907) Avail: NTIS HC A07/MF A01 CSCL 14B

For potential applications in space infrared astronomy missions such as the Space Infrared Telescope Facility and the Large Deployable Reflector, integrated arrays of long-wavelength detectos are desired. The results of a feasibility study which developed a design for applying integrated array techniques to a long-wavelength (gallium-doped germanium) material to achieve spectral coverage between 30 and 200 microns are presented. An approach which builds up a two-dimensional array by stacking linear detector modules is presented. The spectral response of the Ge:Ga detectors is extended to 200 micron m by application of uniaxial stress to the stack of modules. The detectors are assembled with 1 mm spacing between the elements. Multiplexed readout of each module is accomplished with integration sampling of a metal-oxide-semiconductor (MOS) switch chip. Aspects of the overall design, including the anticipated level of particle effects on the array in the space environment, a transparent electrode design for 200 micron m response, estimates of optical crosstalk, and mechanical stress design calculations are included. Author

N84-34709*# National Aeronautics and Space Administration, Washington, D. C.
MAGNETIC RECORD SUPPORT
M. Nakayama, H. Morita, Y. Tokuoka, T. Izumi, K. Fukuda, and Y. Kubota Oct. 1984 19 p Transl. into ENGLISH of German Patent No. DE3321907-A1, 22 Dec. 1983 p 1-23 Transl. by Kanner (Leo) Associates, Redwod City, Calif. Original doc. prep. by TDK Corp., Tokyo, Japan
(Contract NASw-3541)
(NASA-TM-77619; NAS 1.15:77619) Avail: NTIS HC A02/MF A01 CSCL 14E

The magnetic layer of a magnetic record support is coated with a thin film of a polymer with a siloxane bond. The magnetic layer consists of a thin film obtained by vacuum metallization, cathode sputtering or dispersion of a ferromagnetic metal powder in a binder. The polymer with a siloxane bond is produced by the polymerization of an organic silicon compound which inherently contains or is able to form this bond. Polymerization is preferably performed by plasma polymerization. Author

N84-34710# Oklahoma State Univ., Stillwater. Power Research Center.
PARAMETER MEASUREMENT METHODS FOR INTERFACING HYDRAULIC SYSTEMS WITH MICROELECTRONIC INSTRUMENTS AND CONTROLLERS Final Technical Report, 25 Sep. 1982 - 24 Sep. 1983
E. C. Fitch, I. T. Hong, and J. Mortensen Nov. 1983 245 p
(Contract DAAK70-82-C-0162)
(AD-A144208; OSU-FPRC-83-A-S1) Avail: NTIS HC A11/MF A01 CSCL 13/7

The function of a parameter measurement system is accomplished by converting the nonelectrical quantity to be measured into an electrical form. This report presents the results of efforts carried out in the gathering, organization, and compilation of technical data available on parameter measurement devices for hydraulic systems. Based on the compilation of data, specification formats were developed for assisting in the selection and procurement of parameter measurement system components. The specification sheets for most commonly used transducers are presented in Chapter 3. GRA

N84-34711# Mitre Corp., Bedford, Mass.
LARGE SCREEN DISPLAY TECHNOLOGY SURVEY Final Report
R. M. Carbone Jul. 1984 116 p
(Contract F19628-82-C-0001)
(AD-A144222; MTR-8907; ESD-TR-84-165) Avail: NTIS HC A06/MF A01 CSCL 14/2

This document provides information on the technologies of large screen displays which can be used in command and control applications. The present survey incorporates information on existing product line equipment and includes new devices which are just entering the market or are in an advanced stage of development. This material is based upon the results of an

extensive survey of manufacturers of large screen display equipment for commercial and military applications. Author (GRA)

N84-34712# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NEW DEVELOPMENTS IN SENSORS
R. Fuji 1 Aug. 1984 34 p Transl. into ENGLISH from of Dianzi Jishu Yingyang (China), no. 5, 1983 p 11-18
(AD-A144367; FTD-ID(RS)T-0709-84) Avail: NTIS HC A03/MF A01 CSCL 17/5

The development of sensors over the past several years is summarized, including sensor solidification and integration and making sensors graphic and intelligent. Changes in mechanical, thermal, optical, ray, magnetic, gas, and humidity sensors are discussed. Several novel principles of sensors are presented. R.S.F.

N84-34713# Department of the Air Force, Washington, D.C.
X33 CUT QUARTZ FOR TEMPERATURE COMPENSATED SAW DEVICES Patent Application
Richard T. Webster, inventor (to Air Force) Filed 25 May 1984 15 p
(AD-D011200; US-Patent-Appl-SN-614190) Avail: NTIS HC A02/MF A01 CSCL 20/1

The present invention utilizes an X-cut, 33.44 degree quartz substrate for propagating surface acoustic waves with zero temperature coefficient of surface acoustic wave delay at room temperature. The phase velocity of the surface acoustic wave which propagates in the Y-Z plane, is in a direction of 33.44 degrees from the +Y crystalline axis toward the +Z axis. This orientation is described by the Euler angles of lambda = 90 degrees micron = 90 degrees, and theta = 33.44 degrees. Author (GRA)

N84-34714# Department of the Army, Washington, D. C.
FREQUENCY SYNTHESIZER Patent Application
Arthur Ballato, inventor (to Army) Filed 22 Aug. 1984 13 p
(AD-D011203; US-Patent-Appl-SN-639755) Avail: NTIS HC A02/MF A01 CSCL 09/5

A frequency synthesizer is provided that is capable of supplying a plurality of accurate frequencies. The frequency synthesizer comprises a resonator matrix including a plurality of resonators embedded in a single monolithic piece of piezoelectric crystal. The resonators are arranged in rectangular row and column configuration including m rows and n columns. Each of the rows of resonators bears a metallic electrode stripe for that row and each of the columns of resonators bears a metallic electrode stripe for that column, the electrodes row stripes being positioned on the top surface of the crystal and the electrode column stripes being positioned on the bottom surface of the crystal. Two diode arrays are positioned on the periphery of the crystal for addressing the individual row electrode stripes and the individual column electrode stripes so that any desired resonator can be activated by connecting the stripe corresponding to its row address and the stripe corresponding to its column address to a suitable active oscillator network. Author (GRA)

N84-34491*# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
DISTORTION MEASUREMENT OF ANTENNAS UNDER SPACE SIMULATION CONDITIONS WITH HIGH ACCURACY AND HIGH RESOLUTION BY MEANS OF HOLOGRAPHY
Holm U. Frey *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 309-319 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 14E

N84-34741# Imperial Coll. of Science and Technology, London (England).
CIRCULAR-SCAN PHOTOCHRON STREAK CAMERA FOR SPACEBORNE LASER RANGING APPLICATIONS
W. Sibbett, W. E. Sleat (MBB G.m.b.H., Munich), and W. Krause *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p refs (For primary document see N84-34715 24-36)
(Contract ESTEC-5159/82/NL-HP(SC))
Avail: NTIS HC A14/MF A01

N84-35083# Joint Publications Research Service, Arlington, Va.
DEVICE FOR MEASURING OXYGEN Abstract Only
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 22-23 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 94 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

N84-35084# Joint Publications Research Service, Arlington, Va.
DIGITAL ELECTRONIC HYGROMETER Abstract Only
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 23-24 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 95 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N84-34715# European Space Agency, Paris (France).
SPACE LASER APPLICATIONS AND TECHNOLOGIES (SPLAT)
Bruce Battrick, comp. and Erica Rolfe, comp. May 1984 324 p refs Partly in ENGLISH and FRENCH Proc. of ESA Workshop, Les Diablerets, Switzerland, 25-30 Mar. 1984
(ESA-SP-202; ISSN-0379-6566) Avail: NTIS HC A14/MF A01

The use of spaceborne lasers for communications, solid Earth studies, atmospheric studies, and space operations and navigation was discussed. For individual titles, see N84-34716 through N84-34754.

N84-34716# European Space Agency, Paris (France).
ESA AND ITS PROGRAMS: PRESENT AND FUTURE c81
E. Mallett *In its* Space Laser Appl. and Technol. (SPLAT) May 1984 3 p (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The ESA telecommunications, rendezvous and docking, meteorological, remote sensing, climatology and geodesy laser applications programs are outlined. Author (ESA)

N84-34717# European Space Research and Technology Center, Noordwijk (Netherlands).
THE ESA TECHNOLOGICAL RESEARCH PROGRAMS c81
M. Trella *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Funding, decision making, and research management aspects of ESA's technology program are introduced. Author (ESA)

N84-34718# Technische Univ., Vienna (Austria). Inst. fuer Nachrichtentechnik.
PROSPECTS OF LASER COMMUNICATIONS IN SPACE c32
Walter R. Leeb *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 11 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Laser communication systems using the high antenna gain achievable with small antenna mass for space applications are reviewed. Comparison of the optical receiver sensitivity achieved with fundamental limits for the channel capacity shows that there is much room for improvement. Typical requirements for pointing, acquisition, and tracking are discussed; possible improvements in semiconductor lasers are highlighted. The influence of space radiation environment on laser and detector crystals is considered. Author (ESA)

N84-34719# Eidgenoessische Techniche Hochschule, Zurich (Switzerland). Inst. fuer Geodaesie und Photogrammetrie.
SPACE LASER APPLICATIONS IN GEOPHYSICS c46
H.-G. Kahle and F. Barlier (Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse, France) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The use of spaceborne lasers to study the Earth's dynamic processes for earthquake prediction is discussed. Apart from fault plane solutions of earthquakes, important data sets, from which constraints on deep seated tectonic processes can be derived, include detailed gravity field determination at intermediate wavelengths and precise point-positioning for monitoring changes of very long baselines across major plate boundaries. Geophysical problems related to global geodynamics are defined and geodetic techniques contributing to their solutions are described. Author (ESA)

N84-34720# Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
EARTH'S ROTATION AND ITS GEOPHYSICAL IMPLICATIONS c46
F. Barlier and H. G. Kahle (Eidgenoessisches Technische Hochschule, Zurich) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 3 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Determination of the Earth's rotation parameters by laser telemetry is discussed. Laser telemetry data on polar motion, axial spin rate, and recurrent oscillations are presented. Author (ESA)

N84-34721# Centre National d'Etudes Spatiales, Paris (France).
SPACEBORNE LASERS IN ATMOSPHERIC RESEARCH c46
J. E. Blamont *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Principles of lidar technique; lidar results in atmospheric physics and chemistry; and laser utilization in space are discussed. In atmospheric science, lidar can provide tropospheric data for global prediction models. It can track stratospheric debris for monitoring pollution transport. It can provide input data for models of radiative energy exchanges, and the effect on these exchanges of atmospheric composition. Lidar could study vertical structure of abundances in the stratosphere. It could study planetary waves and stratospheric winds. Author (ESA)

N84-34722# European Space Research and Technology Center, Noordwijk (Netherlands).
OUTLOOK OF LASERS IN SPACE OPERATIONS AND NAVIGATION
W. H. Fehse and Ph. Hartl (Stuttgart Univ.) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 12 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Space mission scenarios presently under study by ESA, for which laser sensors might be of interest, are discussed. It is shown that there are various needs for very precise guidance, tracking and alignment sensors. Rendezvous and docking, station keeping for satellite clusters, geometric measurements for large structures and relevant scientific missions are considered. Due to the progress in semiconductor laser technology, its use for short and medium range applications is of particular interest. The CO2 laser technology is important for long range applications. Author (ESA)

N84-34723# European Space Research and Technology Center, Noordwijk (Netherlands).
INTERSATELLITE LINKS: REQUIREMENTS FOR FUTURE MISSIONS AND LIMITATIONS FROM SPACECRAFT RESOURCES c32
G. Mica *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Intersatellite links (ISL) added to existing systems for benefits in communication range, capacity coverage, connectivity, and synchronization are indicated. System costs in terms of requirements on the spacecraft and development risks are discussed. For a deep space mission, long geo-arc and cluster communication ISL link budgets are analyzed, comparing microwaves and laser links. Mass, power, volume requirements and critical developments are examined, particularly growth potential. It is concluded that microwave and optical ISL's have complementary roles and require specific optimization. Author (ESA)

N84-34724# Standard Communication Labs. Ltd., Harlow (England).
HIGH RELIABILITY SEMICONDUCTOR LASERS FOR DATA LINKS BETWEEN SATELLITES
A. R. Goodwin *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The performance of semiconductor lasers with regard to reliability, high power output and mode structure is reviewed. Optical confinement, and the development of two semiconductor lasers qualified for reliability are discussed. Author (ESA)

N84-34725# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Service d'Aeronomie.
SPACEBORNE LIDAR APPLICATIONS TO METEOROLOGY AND ENVIRONMENTAL STUDIES c47
G. Megie, J. Pelon, and P. Flamant *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The use of a spaceborne platform system to probe the atmosphere with high spatial resolution, applying lidar for meteorology, and environmental studies is reviewed. Cloud top height, tropospheric clouds and aerosols, cirrus clouds ice/water discrimination, stratospheric and tropospheric ozone monitoring, pressure and temperature measurements in the troposphere, and winds determination are discussed. Advantages of active laser sounding with respect to observational requirements and passive systems are emphasized. Author (ESA)

N84-34726# Siegen Univ., (West Germany).
PERFORMANCE CAPABILITIES OF LASER RANGING SENSORS
R. Schwarte *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Laser sensors in space target detection and tracking, automatic rendezvous and docking, position, alignment and attitude control, and contour measurement are discussed. Performance capabilities of laser sensors using pulsed or CW-modulated laser diodes are described. It is stated that considerable effort must be made to attain the potential specifications of spaceborne ranging sensors. Improvements to the pulsed laser diode system proved by experimental results are given. Author (ESA)

N84-34727# Communications Satellite Corp., Clarksburg, Md.
TECHNOLOGIES FOR INTERSATELLITE OPTICAL COMMUNICATIONS c32
Gerhard A. Koepf *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Intersatellite optical communications links using RF-excited CO2 lasers, diode-pumped Nd:YAG lasers, optical power combining, and phased array formation with GaAlAs lasers are reviewed. Analysis includes the worst case, a maximum range of 40,000 km under solar conjunction conditions, and analog modulation. The analysis produces a definition of antenna diameter and prime power intervals. The systems were also compared with respect to beam pointing and tracking requirements, and mass/volume and lifetime expectations. Author (ESA)

N84-34728# Centre d'Etudes et de Recherches, Toulouse (France).

CHARACTERIZATION OF HIGH POWERED LASER DIODES c32

J.-P. Bouzinc, Y. Aubry, H. Isbert, and M. Plantee *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p In FRENCH Sponsored by CNES (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

High power (>20 mW) continuous wave laser diodes for space applications were characterized optically and electrically. Static characteristics at constant temperature; near field diagram as a function of total power at 20 C; pass band for weak signals as a function of polarization current at 20 C; spectrum analysis as a function of modulation, and optical power; mode drift and shifts as a function of current and temperature; rate of polarization; and far field were covered. Author (ESA)

N84-34729# Technische Univ., Vienna (Austria). Inst. fuer Nachrichtentechnik.
EXPERIMENTAL ASSESSMENT OF SEMICONDUCTOR LASERS FOR OPTICAL DATA LINKS IN SPACE
A. Popescu, B. Furch, A. L. Scholtz, and W. R. Leeb *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 5 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The suitability for intersatellite optical communication of four commercially available semiconductor lasers emitting at 830 nm was tested in order to establish operating parameters yielding high-power optical pulses. The near and far field patterns and the spectral distribution of the pulse energy were measured to characterize the laser types. For laser lifetime the choice of the coding format plays an important role. Results show that pulse position modulation ensures the longest lifetime for a given maximum pulse power. For the laser best-suited for the foreseen application, the maximum distance which can be bridged in space with 0.1 m diameter antennas at 10 Mbit/sec is > 10,000 km are described. Author (ESA)

N84-34730# Centre National d'Etudes Spatiales, Toulouse (France).
OPTICAL DATA LINKS FOR THE STAR MISSION [LIAISONS OPTIQUES INTERSATELLITES DANS LE CADRE DE LA MISSION STAR]
J. C. Boutemy, B. Cousin, L. Frecon, and E. Sein *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p refs In FRENCH (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

An intersatellite optical data link based on laser diodes with silicium avalanche photodiodes and a CO2 laser is described. The optical system is based on a 250 mm Cassegrain telescope with telecommunication and pointing/acquisition subassemblies for the low orbit satellite; and a 500 mm Cassegrain telescope for the geosynchronous satellite. Performance analyses indicate that for the high bit rates demanded (400 Mbits/sec) laser diodes are a feasible alternative to classical data links, if pointing accuracy of 1 micro rad can be achieved, and if a semiconductor source with > 50 mW power and the required lifetime and reliability is found. Author (ESA)

N84-34731# Battelle Inst., Frankfurt am Main (West Germany).
A CO2 LASER TRANSCEIVER PACKAGE WITH GBIT/SEC CAPABILITY FOR SPACE-TO-SPACE COMMUNICATIONS
W. Englisch, M. Endemann, W. Diehl, and W. Wiesemann *In* ESA Space Laser Appl. And Technol. (SPLAT) May 1984 7 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The design of CO2 laser transceiver system to establish and maintain a two way 1 Gbit/sec data link between two independently orbiting satellites is presented. The overall package has envelope dimensions of 70x35x90 cm, weighs 37 kg, and consumes 250 W of prime power. It comprises an externally modulated CO2 laser transmitter, an optical homodyne receiver, diffraction limited transceiving optics, a high performance pointing acquisition and tracking subsystem, and a stable light weight mechanical structure. Operational procedures are discussed and calculated performance data are given. Author (ESA)

N84-34732# Technische Univ., Vienna (Austria). Inst. fuer Nachrichtentechnik.
RECEIVER CONCEPTS FOR DATA TRANSMISSION AT 10 MICRONS c32
A. L. Scholtz, H. K. Philipp, and W. R. Leeb *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Receivers for digitally modulated CO2 laser signals are compared. Incoherent heterodyne receivers and coherent homodyne setups, including the linear phase locked loop (PLL) receiver, the low intermediate frequency translation loop, and the Costas loop receiver were studied. Experiments covered the homodyne systems, emphasizing the linear PLL receiver. Reliable phase lock of the receiver is achieved at carrier levels as low as 3 nW. Reception of signals phase shift keyed with a data rate of up to 150 Mbit/sec is demonstrated at subnanowatt sideband power levels. Author (ESA)

N84-34733# Stuttgart Univ. (West Germany). Inst. for Navigation.
THE CONCEPT OF THE LOW INTERMEDIATE FREQUENCY TRANSLATION LOOP (LIFTL) AND ITS APPLICATION ON A CO2 LASER INTERSATELLITE DATA LINK SYSTEM c32
M. Wittig *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 5 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Detection schemes for optical phase modulated digital signals at 10 micron wavelength are discussed. The systems transmit the high carrier signal and the PSK-signal to use it at the receiver site for carrier regeneration. Homodyne detection leads to a loss of signal to noise ratio of 3 dB for two detection schemes. A solution with an additional electro-optical modulator shows only a loss of 1dB of S/N compared with the homodyne, but at a price of an additional modulator and reduced power for carrier recovery. The phase modulated low intermediate frequency translation loop (PM-LIFTL) needs less bandwidth than a heterodyne system. During the signal acquisition phase, which occurs 2 to 16 times per day for a LEO-GEO system, the high transmitted signal in PM-LIFTL case is of great advantage. The only disadvantage is the loss in S/N of about 3 dB but this is acceptable. Author (ESA)

N84-34734# European Space Agency, Noordwikj (Netherlands). Satellite System Design.
ACCOMMODATION OF CANDIDATE LASER COMMUNICATION LINKS ON SELECTED SPACECRAFT CONFIGURATIONS c15
L. vanHoltz *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 p 123-129 refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The feasibility of accommodating laser links on medium size, half Ariane 4 and PAM D2 compatible communication spacecraft is discussed. Assessment of the implementation aspects of a laser transceiver package suggests that its size, power dissipation and detector/diode thermal conditions effectively require a spacecraft configuration well adapted to these demands. The standard OTS type configuration is less flexible in this respect compared to the sunpointing configuration. The major challenge with the standard configuration is to provide acceptable thermal conditions for the laser unit, in particular at detector/mixer level of the CO2 laser. Author (ESA)

N84-34735# Teldix Luftfahrt-Ausruestungs G.m.b.H., Heidelberg (West Germany).
POINTING, ACQUISITION AND TRACKING FOR INTERSATELLITE OPTICAL DATA LINKS c15
W. Auer *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A07

Pointing, acquisition, and tracking systems (PATS) for high

capacity satellite-to-satellite communication using modulated laser light with coherent detection are discussed. To initiate communication between satellites, a pointing accuracy of the order of 1 min of arc is necessary. After acquisition, a tracking accuracy of 7 micro rad (1.5 sec of arc) is necessary to transmit data with rates of several 100 Mbit/sec with low power and low error rates. The anticipated PATS comprises a coarse pointing system, a fine pointing arrangement, a point ahead assembly, a nutator, and associated control and drive electronics. Author (ESA)

N84-34736# Deutsches Geodaetisches Forschungsinstitut, Munich (West Germany).
ACCURACY REQUIREMENTS OF SPACE LASER SYSTEMS FOR GEODETIC APPLICATIONS c43
R. J. Cuno *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Two applications of space laser systems for geodetic tasks, and their accuracy requirements are discussed. In one case a satellite borne laser ranging system estimates baseline lengths between passive ground based retroreflectors. In the second case a high stability spaceborne laser forms an optical interferometer together with two retroreflector subsatellites. In this satellite-to-satellite tracking experiment high resolution gravity field information is obtained from the measured relative velocity between the subsatellites. Author (ESA)

N84-34737# Pavia Univ. (Italy). Dipt. di Fisica Nucleare e Teorica.
FUTURE OF LASER INTERFORMETRY IN SPACE
B. Bertotti *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Laser interferometry measurement of the fine structure of the gravity field of the Earth using low orbiting satellites, and low frequency gravitational wave detection in interplanetary space are discussed. The fringe motion created on a central satellite by two interfering laser beams reflected back by two other spacecraft is measured. Unlike ordinary Doppler microwave interferometry, the medium has very little effect upon optical propagation; the differential character of the measurement relieves the problem of the stability of the frequency standard. If the spacecrafts have a system to compensate or measure nongravitational forces, this could provide important information about the gravitational field. Author (ESA)

N84-34738# Technische Univ., Munich (West Germany). Inst. fuer Astronomische und Physikalische Geodaesie.
CENTER OF MASS CORRECTION AND ITS CONFIDENCE FOR THE PRECISE ORBITAL POSITIONING SATELLITE (POPSAT) c32
Dieter Egger, Eberhard Achtermann (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany), and Ulrich Rupe (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p ref (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The POPSAT spacecraft laser retroreflector array is discussed. Simultaneous operation of microwave and laser tracking systems is used to compare the methods. A retroreflector array on a spherical surface in three concentric rings around the Earth oriented axis of the satellite was analyzed by laser light path simulation. The characteristics of a typical laser ground station are taken as input. The simulation also considers the effects of the atmosphere and of the reflector array on POPSAT. The response signal at the ground receiver is compared with the theoretical distance, so that an average center of mass correction and its statistical confidence value can be deduced. Results indicate that the retroreflector array concept yields range measurement accuracies comparable to LAGEOS. Author (ESA)

N84-34739# Technische Univ., Munich (West Germany). Forschungseinrichtung Satellitengeodaesie.
SYSTEMS ANALYSIS AND COMPUTER SIMULATION STUDIES OF THE LASER RANGING MEASUREMENT PROCESS
Dieter Egger *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Systems analysis of laser ranging by measuring round-trip travel times of laser pulses is outlined. A digital simulation model implemented on a main frame computer is used to investigate laser ranging to the LAGEOS satellite. Simulation of laser ranging supplies estimates of corrections to travel times due to the atmosphere, reflector array, trigger, and their statistical confidence. Arbitrary variants of components and variations of parameter settings of the measurement system (e.g., laser, telescope, trigger, satellite) can be scrutinized, including those technically not completed. Author (ESA)

N84-34740# Kaiserslautern Univ. (West Germany). Dept. of Physics.
GENERATION OF ULTRA-SHORT LASER PULSES IN THE VISIBLE AND NEAR INFRARED FOR A SPACEBORNE LASER RANGING TRANSMITTER
W. Krause (MBB G.m.b.H., Munich), F. Voelker, and H. Weber *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 10 p refs (For primary document see N84-34715 24-36)
(Contract ESTEC-5159/82/NL-HP(SC))
Avail: NTIS HC A14/MF A01

The breadboard model and development status of a regenerative pulse compressor type of picosecond pulse laser source for space use are described. It is argued that the combination of the regenerative compressor concept with the wide gain bandwidths provided by vibronic laser materials emitting at wavelengths in the vicinity of 750 nm result in a reliable device of reduced instrumental complexity. The theoretical estimations concerning intense short-pulse generation capability and reducible power consumption are encouraging. Author (ESA)

N84-34741# Imperial Coll. of Science and Technology, London (England).
CIRCULAR-SCAN PHOTOCHRON STREAK CAMERA FOR SPACEBORNE LASER RANGING APPLICATIONS c35
W. Sibbett, W. E. Sleat (MBB G.m.b.H., Munich), and W. Krause *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p refs (For primary document see N84-34715 24-36)
(Contract ESTEC-5159/82/NL-HP(SC))
Avail: NTIS HC A14/MF A01

An internally intensified circular scan streak camera with temporal resolution better than 6psec was designed for a dual-wavelength (760nm, 380nm) spaceborne laser ranging system. Results of the operation or an experimental pre-prototype version are given. Refinements to the image tube construction and the laboratory evaluation of the limiting dynamic performance of the camera are discussed. Author (ESA)

N84-34742# Technische Hogeschool, Delft (Netherlands). Dept. of Geodesy.
SPACE/AIRBORNE LASER RANGING (SALR) AS COMPLEMENT TO GROUNDBASED TRANSPORTABLE SATELLITE LASER RANGING (SLR) c43
B. H. W. vanGelder and L. Aardoom *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

The application of space/airborne laser ranging (SALR) techniques to crustal deformation studies is discussed. The deployment of (modular) transportable laser ranging systems ((M)TLRS) is expected to make major contributions to knowledge of the dynamic behavior of the Earth. For reasons of cost effectiveness, the spacing of sites of regional crustal monitoring networks is 500 km and up when visited by (M)TLRS's. The SALR systems are highly cost effective for local surveys with centimeter accuracy, rendering them complementary to groundbased SLR by modular systems. Feasibility studies show that SALR networks must be viewed as a densification of the higher order SLR

networks. The SLR sites provide a framework to which the SALR network hindered by problems of critical configuration needs to be tied. The (M)TLRS system can provide observations to facilitate orbit determination of the SALR space segment. Author (ESA)

N84-34743*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACEBORNE LIDAR INVESTIGATIONS OF THE ATMOSPHERE c46
E. V. Browell and S. Ismail (Systems and Applied Sciences Corp., Hampton, Va.) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01 CSCL 04A

Atmospheric investigations with a spaceborne lidar system are discussed. Measurements of aerosols, O3, and H2O with the NASA/LaRC airborne DIAL system are presented as examples of data obtained from space. The NASA/CNES study of an autonomous differential absorption lidar system is described. This system is a precursor to a spaceborne lidar system. Simulations of spaceborne lidar experiments are reviewed, and laser requirements for a spaceborne lidar system are presented. Author (ESA)

N84-34744*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. Service d'Aeronomie.
AN ER-2 AIRCRAFT AIRBORNE LIDAR AS PART OF THE DEVELOPMENT PROGRAM OF A SPACEBORNE SYSTEM: A POTENTIAL NASA/CNES COOPERATIVE PROJECT
G. Megie, P. Flamant (Ecole Polytechnique, Palaiseau, France), M. Bourdet (Institut National d'Astronomie et de Geophysque, Paris), E. Browell (NASA. Langley Research Center), W. Hall, and J. Talbot *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 p 189-195 refs Prepared in cooperation with CNRS, Verrieres (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01 CSCL 20E

A lidar system for atmospheric investigations to fly aboard a high altitude aircraft is introduced. Scientific objectives of the program are reviewed in terms of the expected accuracy and temporal and/or spatial resolution of measurements such as ozone vertical profiles in the troposphere and stratosphere, cirrus clouds studies, tropospheric and stratospheric aerosol monitoring and water vapor measurements in the boundary layer and at the troposphere stratosphere interface. The instrument is conceived as an autonomous, space qualified system as a first step towards a fully automated system for spaceborne applications.
Author (ESA)

N84-34745# Battelle Inst., Frankfurt am Main (West Germany).
DESIGN OF A SPACEBORNE LIDAR FOR MEASUREMENTS FROM OPERATIONAL SATELLITES
M. Endemann and W. Englisch *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Instrument layout and subunit and component specifications of a satellite-borne meteorological lidar are described. Performance analyses indicate that cloud-top height and haze profiles can be measured with a spatial resolution of 150 m vertical and an average grid size < 20 km. The distribution of tropospheric aerosols can be determined with good spatial resolution if background radiation is low. Only in the most unfavorable conditions, i.e., looking into the Sun glint at the ocean, very thin aerosol layers may not be detected with the desired spatial resolution. Differential absorption measurements require a much better SN ratio and thus have reduced spatial resolution. Even with a conservative SN (100) spatial resolution is still equal or better than specified for scattering off low tropospheric aerosol layers. At high altitudes, useful measurements can be performed for low levels of background radiation. Author (ESA)

N84-34746# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for Atmospheric Physics.
MAPPING OF ARCTIC HAZE USING AIRBORNE LIDAR c47
W. Renger, P. Moerl, P. Wendling (Stockholm Univ.), and J. Heintzenberg *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 5 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

An airborne Nd:YAG aerosol lidar was used in a ground and aircraft campaign to map Arctic haze. Aerosol profiles, standard meteorological parameters and atmospheric absorption were measured by a sampling method along the flight path. These data were cross correlated to ground truth data. Measuring accuracy and the influence of locally produced pollution are discussed. Implications for an operational spaceborne lidar are considered. Author (ESA)

N84-34747# Consiglio Nazionale delle Ricerche, Florence (Italy). Ist. di Ricerca sulle Onde Elletromagnetiche.
LASER REMOTE SENSING AT IROE
L. Stefanutti, E. Capannini, F. Castagnoli, L. Ciraolo, M. Morandi, B. Radicati, and P. Spalla *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 5 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

A combined lidar-laser ranging system is described. Common equipment includes the laser transmitter, the optical receiver and the mechanical gimble mount. A minicomputer is used for controlling and acquisition in both uses. It processes most of the lidar results, and in laser tracking, expands inter range vectors to calculate the predicted orbit over the station. The receiver; electronics related to the lidar system and the timing section; and acquisition and tracking software are discussed. Author (ESA)

N84-34748# Kiel Univ. (West Germany). Inst. fuer Meereskunde.
DIFFERENTIAL ABSORPTION LIDAR IN SPACE FOR TEMPERATURE AND HUMIDITY PROFILES IN THE ATMOSPHERE c46
H. Grassl and P. Schluessel *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs Sponsored by Battelle Institut (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Computer simulations of the differential absorption lidar (DIAL) technique in a spacecraft for temperature and humidity profiling are reviewed. Current technology applied to O2 and H2O lines in the 0.7 to 0.8 micron band gives sufficiently high signal-to-noise ratios (up to 50 for a single pulse pair) if backscattering by aerosol particles is high, i.e., profiling accurate to 2 K for temperature and 10% for humidity is feasible with the turbid lower troposphere in 1 km layers and with an averaging over 100 pulses. The impact of short term fluctuations in aerosol particle concentration is too big for a one laser system. Only a two laser system firing at a time lag of about 1 millisec can surmount the difficulties. The finite width of the laser line and the quasi-random shift of this line introduce tolerable, partly systematic errors. Author (ESA)

N84-34749# Hull Univ. (England).
THE USE OF TEA AND MULTIATMOSPHERE CO2 LASERS IN ACTIVE REMOTE SENSING c43
J. W. vanDijk, J. F. Kusters, A. Layfield, and B. J. Rye *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs Sponsored by UK Department of Trade and Industry, UK Science and Engineering Research Council and CEC Directorate General for Science (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Interpretation of differential absorption lidar data with direct detection or coherent receivers is discussed. To avoid bias the atmospheric propagation channel must be common to all wavelengths transmitted so the laser source must be able to satisfy this requirement; front end mean carrier to noise ratios in the different channels must either be equal or all somewhat in excess of unity. The amplications of these results in the context of pulsed CO2 sources are considered. A fully tunable multiatmosphere laser operating simultaneously in more than one mode optimizes the sensitivity of the measurement. Author (ESA)

N84-34750# Royal Signals and Radar Establishment, Malvern (England).
WIND MEASUREMENT WITH COHERENT LASER RADAR AT 10 MICRONS c47
J. M. Vaughan and A. A. Woodfield *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Air and spaceborne systems for wind measurement with coherent laser radars are described. The continuous wave laser True Airspeed System airborne equipment shows excellent reliability and performance throughout three years of flight trials in a great variety of meteorological conditions. A pulsed laser system is proposed for global wind field monitoring. Feasibility studies of this WINDSAT equipment were made for shuttle and satellite mounted operation. Questions of laser performance and atmospheric backscattering strength are discussed. Author (ESA)

N84-34751# Stuttgart Univ. (West Germany). Inst. for Navigation.
DESIGN CRITERIA FOR SPACE BASED LASER RANGING SYSTEMS
M. Wittig and A. Wehr *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Criteria for the design of space-based laser ranging systems, including output signal-to-noise as a function of the received signal power for various types of photodetectors, search field of view, search duration, maximum range, ranging accuracy, transmitter beam divergence and transmitter power are discussed. Semiconductors and photomultiplier tubes (PMT's) are considered. Among the semiconductors, avalanche photodiodes (APD's) are preferred because pin-diodes have strong thermal noise in addition to the shot noise at the low power levels of interest. Multiplier tubes show almost ideal features with regard to thermal noise and therefore are preferable to APD'S. Based an APD, the performance of pulsed and continuous wave ranging systems is analyzed.
Author (ESA)

N84-34752# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
CONTINUOUS WAVE (CW) DIODE LASER INSTRUMENTATION FOR RENDEZVOUS AND DOCKING MANEUVERS IN GEO-SYNCHRONOUS ORBITS c19
G. Sepp *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

A rendezvous and docking (RVD) laser radar system onboard a chaser spacecraft is described. The target spacecraft is equipped with several docking ports and retroreflectors. The RVD procedure from the initial target acquisition until docking, including methods of measuring range, velocity, relative orientation between chaser and target, docking port identification, and field of view explosion during the last meters is summarized. The problems of receiver background and signal dynamics are discussed and results of theoretical performance calculations, including results for a video communications link between chaser and target spacecraft are given. Replacing the mechanical scan mirrors with an all-solid state acousto-optical deflection device is considered. Author (ESA)

N84-34753# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
RENDEZVOUS AND DOCKING MISSION AND NAVIGATION SENSORS c12
A. Getzschmann *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 p 255-260 (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

Guided phase, homing phase, final approach, and docking of a chaser to a communications platform in geosynchronous orbit are outlined. Microwave sensors, a sensor derived from a star sensor, and video camera navigation aids are discussed.
Author (ESA)

N84-34754# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
LASER DIODE RANGE FINDER - TARGET ACQUISITION AND TRACKING SYSTEM FUNCTIONAL MODEL/DEMONSTRATION MODEL
S. Manhart and G. Barthel *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 5 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

A spaceborne automatic target acquisition and tracking system consisting of a laser diode rangefinder, a two axes beam deflection unit, and a microprocessor control system was built. It incorporates a pulsed diode rangefinder for acquisition and unambiguous range determination and a continuous wave laser diode rangefinder for tracking and precise range measurement. Ranging schemes were assessed to combine all necessary functions in a single ranging device, with the possibility to implement advanced techniques in the follow-on activities. A ranging technique involving a pulsed laser system only is recommended for the demonstration model. Author (ESA)

N84-34755# Naval Academy, Annapolis, Md. Mathematics and Sciences Div.
LASER DAMAGE AND EFFECTS BIBLIOGRAPHY. PART 1: JOURNAL LITERATURE THROUGH 1982 Interim Report
C. W. Rector 15 Jun. 1984 219 p
(AD-A144313; USNA-MS-01-84-Pt-1) Avail: NTIS HC A10/MF A01 CSCL 20/5

A listing is given of a computer-based bibliography on laser-induced damage and effects covering the open journal literature through 1982. Although the computer entries are content-keyed in a detailed fashion, the listing here is broken down into six categories: (1) General laser damage and energy/momentum coupling; (2) Damage to optical materials; (3) Laser plasma formation and characteristics; (4) Transmission and optical phenomena; (5) Material testing/processing and applications; and (6) Laser fusion related. Author (GRA)

N84-34756# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SMALL CONTINUOUS WAVE (CW) HF CHEMICAL LASER
R. Huang and Y. Sun 25 Jul. 1984 7 p Transl. into ENGLISH from Jiguang (China), v. 10, no. 4, Apr. 1983 p 250-251
(AD-A144322; FTD-ID(RS)T-0712-84) Avail: NTIS HC A02/MF A01 CSCL 20/5

The structure and performance of a small continuous wave HF chemical laser are described. A total of 18 lines from V=1 to 0 and 2 to 1 transitions were observed. The maximum single line output is 900mW. In single frequency operation, the short term frequency stability is about 20 to 30 MHz. R.S.F.

N84-34757# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PARAMETRIC CHARACTERISTICS OF AN ELECTRICALLY INITIATED HF LASER
J. Xu, Y. Chen, G. He, and X. Zhuang 19 Jul. 1984 10 p Transl. into ENGLISH from Jiguang (China), v. 10, no. 5, May 1983 p 286-288
(AD-A144324; FTD-ID(RS)T-0713-84) Avail: NTIS HC A02/MF A01 CSCL 20/5

An electrically initiated one joule output HF laser is described. The dependence of its output characteristics on the operating parameters was studied experimentally. A W44 grating monochromator was used to measure the relative energy distribution of the laser spectrum. R.S.F.

N84-34758# Rochester Univ., N. Y. Dept. of Chemistry.
LASER CONTROL OF CHEMICAL REACTIONS
T. F. George Aug. 1984 19 p
(Contract N00014-80-C-0472)

(AD-A144359; TR-53) Avail: NTIS HC A02/MF A01 CSCL 07/4

A review of experimental results for laser control of chemical reactions is presented, with mention of corresponding theoretical progress. Two general classes of reactions are discussed: gas-phase reactions and reactions occurring at a gas-solid interface. For the first class the following topics are reviewed: state-selected reactions, new reaction pathways and transition-state spectroscopy. For the second class the following topics are reviewed: desorption, chemical vapor deposition, heterogeneous catalysis and microelectronics. Author (GRA)

N84-34759# Dartmouth Coll., Hanover, N.H. Dept. of Physics and Astronomy.
HIGH POWER MILLIMETER WAVELENGTH COHERENT RADIATION SOURCES Scientific Report, 1 Feb. 1983 - 31 Jan. 1984
J. E. Walsh 15 Jun. 1984 79 p
(Grant AF-AFOSR-0168-82)
(AD-A144481; AFOSR-84-0636TR) Avail: NTIS HC A05/MF A01 CSCL 20/5

During the reporting period, Cerenkov Maser resonators with a rectangular configuration were analyzed, constructed and experimentally tested. All of the previous work was based upon cylindrical resonators, a choice which was convenient because of the intrinsic symmetry of the beam transport and focussing. In many potential applications, however, an amplifier would be more useful than a oscillator and a structure which, coupled to a linearly-polarized field would then be far more convenient. It was for this purpose that the rectangular dielectric slab waveguide structures were analyzed and tested. GRA

N84-34760# Battelle Columbus Labs., Ohio.
THREE-DIMENSIONAL PHOTOCHEMICAL MACHINING WITH LASERS Semiannual Technical Report, 1 Aug. 1983 - 31 Jan. 1984
R. E. Schwerzel 8 May 1984 22 p
(Contract F49620-82-C-0077; ARPA Order 4522)
(AD-A144656; AFOSR-84-0588TR; SATR-2) Avail: NTIS HC A02/MF A01 CSCL 20/5

Research on new photoinitiator systems and improved photopolymers for photochemical machining with lasers has resulted in the successful laboratory demonstration of crossed-beam polymerization, although some single-beam polymerization still occurs under the condition examined to date. Porphyrin sensitizers and acrylate polymers have given the best results so far, especially when the samples are first degassed under vacuum to remove oxygen. A computer-controlled three-axis translation stage has been constructed to move the sample relative to the (fixed) laser beams. Future work will be directed toward continued improvement of the polymer materials. Author (GRA)

N84-34761# Commissariat a l'Energie Atomique, Villeneuve-Saint-Georges (France).
ANALYSIS OF EXPERIMENTS ON X-RAY EMISSION FROM LASER-IRRADIATED TARGETS
D. Babonneau, J. L. Bocher, G. DiBona, and X. Fortin Sep. 1983 30 p In FRENCH and ENGLISH Presented at the 16th ECLIM, London, 26-30 Sep. 1983
(DE84-751157; CEA-CONF-7036) Avail: NTIS HC A03/MF A01

The X-ray emission of microballoons and planar targets irradiated with lasers was studied using three techniques. The X-ray spectra were determined using the one dimensional hydrodynamical FCL-1 Limeil code with multigroup radiative transfer and LTE ionization, as well as by using an emission and radiation transfer model with stationary T and R profiles and LTE coronal atomic physics. Theoretical and experimental scaling laws were used to establish X-ray conversion efficiencies. Results obtained using each of these methods are compared. Transl. by A.R.H.

N84-34417# Royal Aircraft Establishment, Bedford (England).
USING AN AIRBORNE CO2 CW LASER FOR FREE STREAM AIRSPEED AND WINDSHEAR MEASUREMENTS
Alan A. Woodfield and J. Michael Vaughan (Royal Signals and Radar Establishment, Malvern, England) *In* AGARD Flight Test Tech. Jul. 1984 18 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

N84-34547# Joint Publications Research Service, Arlington, Va.
HIGH SPEED LASER FORMATION OF SMALL DIAMETER APERTURES IN PRINTED CIRCUIT BOARD BLANKS Abstract Only
F. I. Zhuk, O. S. Lysogorov, and N. I. Chetverikov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 14 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 16-20 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34548# Joint Publications Research Service, Arlington, Va.
ESTIMATING TARGET TEMPERATURE IN LASER EXPERIMENTS IN NITROGEN AT HIGH PRESSURES Abstract Only
A. A. Uglov and Ye. M. Ivanov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 15 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 12-15 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N84-34762 Department of the Navy, Washington, D. C.
RELEASE MECHANISM FOR A CYLINDRICAL OBJECT RECOVERY DEVICE Patent
D. Miller and C. A. Bowers, inventors (to Navy) Issued 1 May 1984 7 p Supersedes AD-D006968
(AD-D011183; US-Patent-4,445,719; US-Patent-Appl-SN-298712; US-Patent-Class-294-88) Avail: US Patent and Trademark Office CSCL 13/5

A release mechanism is provided for a structural member, such as a cylindrical object recovery device, wherein the structural member has top and bottom sides. The release mechanism includes a block which is attachable to the structural member so as to extend thereabove. A piston is mounted in the block and is moveable vertically between up and down positions. At least one rod is connected to the piston and extends vertically downwardly beyond the bottom side of the structural member so as to be capable of moving the piston to the upward position when forcingly engaged by the object. A U-shaped holder is fitted over the block with each leg of the holder having a recess. A pair of pistons is laterally mounted in the U-shaped block in an opposing relationship, and each piston is moveable between inward and outward positions. Each lateral piston is engageable with the holder within the holder recess in the outward position so as to retain the U-shaped holder to the block, and each lateral piston clears the respective holder recess in the inward position so as to release the U-shaped holder from the block. GRA

N84-34763 Department of the Navy, Washington, D. C.
CYLINDRICAL OBJECT RECOVERY DEVICE Patent
D. Miller and C. A. Bowers, inventors (to Navy) Issued 24 Apr. 1984 7 p Supersedes AD-D006967
(AD-D011184; US-Patent-4,444,425; US-Patent-Appl-SN-298700; US-Patent-Class-294-88) Avail: US Patent and Trademark Office CSCL 13/5

A grabber type cylindrical object recovery apparatus is provided wherein the grabber has a U-shaped frame which is curved substantially 180 deg. A pair of curved pads are provided wherein each pad is pivoted to a lower extremity of a respective leg of the U-shaped frame. The inside of the curves of the pads face inwardly with respect to the cylindrical object. In the releasing position a top portion of each pad extends slightly into an open

area within the frame so as to be located for forcible engagement with a top portion of the cylindrical object and then pivotal movement for the grabbing position when the object is encompassed by the U-shaped frame. In the grabbing position the bottom portion of each pad extends the curve of the respective leg beyond the 180 deg of the frame so as to engage a bottom portion of the cylindrical object for retention purposes. A pair of locking devices is provided wherein each locking device is mounted to the frame for locking a respectively pad alternately in its releasing position or its grabbing position. The locking devices are responsive to the forcible engagement of the cylindrical object with the pads to change the locking devices from a locked released position of the pads to a locked grabbing position of the pads. Author (GRA)

N84-34764*# National Aeronautics and Space Administration, Washington, D. C.
ELECTRONIC 4-WHEEL DRIVE CONTROL DEVICE
Sugawara Hayato, Shibata Takanori, Horikoshi Shigeru, and Sakaguchi Tatsunori Oct. 1984 17 p Transl. into ENGLISH of Japanese Patent no. 58-12827 (25 Jan. 1983) 7 p Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77618; NAS 1.15:77618) Avail: NTIS HC A02/MF A01 CSCL 13F

The internal rotation torque generated during operation of a 4-wheel drive vehicle is reduced using a control device whose clutch is attached to one part of the rear-wheel drive shaft. One torque sensor senses the drive torque associated with the rear wheel drive shaft. A second sensor senses the drive torque associated with the front wheel drive shaft. Revolution count sensors sense the revolutions of each drive shaft. By means of a microcomputer, the engagement of the clutch is changed to insure that the ratio of the torque sensors remains constant. Author

N84-34765*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
A COMPARISON OF EXPERIMENTAL AND THEORETICAL RESULTS FOR LEAKAGE, PRESSURE DISTRIBUTION, AND ROTORDYNAMIC COEFFICIENTS FOR ANNULAR GAS SEALS Progress Report
Colby Oran Nicks and Dara W. Childs Sep. 1984 100 p refs
(Contract NAS8-33716)
(NASA-CR-174000; NAS 1.26:174000) Avail: NTIS HC A05/MF A01 CSCL 11A

The importance of seal behavior in rotordynamics is discussed and current annular seal theory is reviewed. A Nelson's analytical-computational method for determining rotordynamic coefficients for this type of compressible-flow seal is outlined. Various means for the experimental identification of the dynamic coefficients are given, and the method employed at the Texas A and M University (TAMU) test facility is explained. The TAMU test apparatus is described, and the test procedures are discussed. Experimental results, including leakage, entrance-loss coefficients, pressure distributions, and rotordynamic coefficients for a smooth and a honeycomb constant-clearance seal are presented and compared to theoretical results from Nelson's analysis. The results for both seals show little sensitivity to the running speed over the test range. Agreement between test results and theory for leakage through the seal is satisfactory. Test results for direct stiffness show a greater sensitivity to fluid pre-rotation than predicted. Results also indicate that the deliberately roughened surface of the honeycomb seal provides improved stability versus the smooth seal. R.S.F.

N84-34766# Stanford Univ., Calif. Robotics Lab.
END-POINT CONTROL OF FLEXIBLE ROBOTS Annual Report, 1 Sep. 1982 - 30 Aug. 1983
T. O. Binford and R. H. Cannon Wright-Patterson AFB, Ohio AFWAL Aug. 1984 43 p
(Contract F33615-82-K-5108)
(AD-A144428; SU-SPO-13389-01-00; AFWAL-TR-84-4091; AR-1) Avail: NTIS HC A03/MF A01 CSCL 06/4

The objectives covered herein were: first, to significantly increase the speed and precision of performing slew and touch tasks for flexible robot arm and second, to develop a universal robot and effector, capable of performing generic manipulation functions. This research concerns key technologies for new classes of robots capable of assembly with force control and great dexterity. GRA

N84-34767# Department of the Army, Washington, D. C.
OPTICAL FIBER SPLICE SLED Patent Application
Claire E. Loscoe and Joseph F. Larkin, inventors (to Army) Filed 5 Jul. 1984 17 p
(AD-D011180; US-Patent-Appl-SN-628091) Avail: NTIS HC A02/MF A01 CSCL 20/6

A housing for optical fibers to be spliced including a pair of movable sleds for supporting the opposing fibers and directing the fibers into opposite ends of a central alignment guide. Retainer sleeves crimped about the cable ends and locator sleeves crimped around individual coated fibers are positioned in slots in each sled to provide precise locations for the fibers. Grooves in the sleds align the fibers for insertion into the guide upon positioning the sleds in recesses at each end of the housing. Movement of the sleds feeds the stripped and cleaved fiber ends through internally tapered rings and into the ends of the alignment guide. Two or more fibers from respective cable ends may be supported on each sled to provide two or more splices in the same housing. GRA

N84-34522# Joint Publications Research Service, Arlington, Va.
DEVICE FOR HIGH FREQUENCY ARC WELDING Abstract Only
N. G. Sinelnikov and G. P. Fetisov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 39 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 37-38 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34523# Joint Publications Research Service, Arlington, Va.
CONTROL OF SEAM FORMATION IN WELDING WITH A LIGHT BEAM Abstract Only
S. A. Fedorov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 39 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 29-30 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34524# Joint Publications Research Service, Arlington, Va.
EFFECT OF PROTECTIVE GAS COMPOSITION ON SEAM FORMATION DURING LASER WELDING Abstract Only
V. V. Kovalev, A. V. Surkov, and N. M. Novozhilov *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 40 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 20-21 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34525# Joint Publications Research Service, Arlington, Va.
FEATURES OF LASER WELDING OF AMg6 ALLOY Abstract Only
A. G. Grigoryants, I. N. Shiganov, V. V. Ivanov, A. M. Pashkevich, V. M. Solovyev, and A. V. Khvorost *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 40-41 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 9, Sep. 1983 p 17-19 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34558# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF INITIAL MICROSTRUCTURES OF OT4-1 ALLOY ELEMENTS JOINED BY DIFFUSION WELDING Abstract Only
V. V. Peshkov and A. O. Kudashov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 28 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 5, May

1983 p 26-27 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34562# Joint Publications Research Service, Arlington, Va.
EXPLOSIVE WELDING IN THE MANUFACTURE OF TITANIUM SHELLS Abstract Only
O. A. Denyachenko and V. I. Romaniv *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 33 Transl. into ENGLISH from Svarochn. Proizv. (Moscow), no. 5, May 1983 p 9-10 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34643# Joint Publications Research Service, Arlington, Va.
TECHNICAL FEATURES OF ROBOTIZED MACHINING SYSTEM VIEWED
V. I. Kokin, O. V. Chalov, and V. V. Balaburdin *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-017) 25 Sep. 1984 p 26-28 Transl. into ENGLISH from Mashinostr. (Moscow), no. 4, Apr. 1984 p 17 (For primary document see N84-34640 24-31)
Copyright. Avail: NTIS HC A03

N84-34644# Joint Publications Research Service, Arlington, Va.
DECISION-MAKING PROCESS IN MANAGEMENT AUTOMATION
Ye. I. Vorobyev *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-017) 25 Sep. 1984 p 29-34 Transl. into ENGLISH from Mashinostr. (Moscow), no. 3, Mar. 1984 p 38-40 (For primary document see N84-34640 24-31)
Copyright. Avail: NTIS HC A03

N84-34648# Joint Publications Research Service, Arlington, Va.
OECD STUDY SHOWS SWEDEN HAS HIGHEST ROBOT-WORKER RATIO
Lars Dahl *In its* West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1983 p 37-38 Transl. into ENGLISH from Dagens Nyheter (Stockholm), 18 Aug. 1983 p 8 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

N84-34649# Joint Publications Research Service, Arlington, Va.
MIDI-ROBOTS GET UNDERWAY IN SEPTEMBER: LAB-INDUSTRY LINK
Jean-Jacques Chiquelin *In its* West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1983 p 39-40 Transl. into ENGLISH from Liberation (Paris), 22 Jun. 1983 p 18 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

N84-34650# Joint Publications Research Service, Arlington, Va.
LAMBERTON ROBOTICS DEVELOPS NEW ROBOT TO HANDLE HEAVY LOADS
In its West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1984 p 42-43 Transl. into ENGLISH from Robots (Paris), Feb. 1983 p 8 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N84-34768 Department of the Air Force, Washington, D.C.
ULTRASONIC INSPECTION OF COMPOSITE MATERIALS Patent
Y. Bar-Cohen and R. L. Crane 3 Jul. 1984 10 p
(AD-D011210; US-Patent-4,457,174; US-Patent-Appl-SN-376891; US-Patent-Class-73-598) Avail: US Patent and Trademark Office CSCL 13/8

A method of ultrasonically inspecting the internal structure of a multi-ply composite material using ultrasonic transducers includes the steps of positioning an ultrasonic transmitter in acoustical contact with one surface of the material, directing a beam of acoustic energy into the material with the angle of incidence of the beam with respect to the surface being less than the second critical angle for the material but greater than normal to the surface, and receiving the reflected energy. In one embodiment, the transmitting and receiving transducers are positioned with their axis perpendicular to the orientation of the reinforcing fibers within the ply being inspected. Internal cracks within each layer of the composite material can be detected along with information regarding their length and number. Further, by precessing the transducers, the orientation of the fibers within each ply will be revealed and this information may be used to confirm proper construction of the composite. GRA

N84-34769*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ULTRASONIC VELOCITY MEASUREMENT USING PHASE-SLOPE CROSS-CORRELATION METHODS
David R. Hull, Harold E. Kautz, and Alex Vary 1984 20 p refs Presented at 1984 Spring Conf. of the Am. Soc. for Nondestructive Testing, Denver, 21-24 May 1984
(NASA-TM-83794; E-2290; NAS 1.15:83794) Avail: NTIS HC A02/MF A01 CSCL 14D

Computer implemented phase-slope and cross-correlation methods are introduced for measuring time delays between pairs of broadband ultrasonic pulse-echo signals for determining velocity in engineering materials. The phase-slope and cross-correlation methods are compared with the overlap method which is currently in wide use. Comparison of digital versions of the three methods shows similar results for most materials having low ultrasonic attenuation. However, the cross-correlation method is preferred for highly attenuating materials. An analytical basis for the cross-correlation method is presented. Examples are given for the three methods investigated to measure velocity in representative materials in the megahertz range. Author

N84-34770# California Univ., Los Angeles.
SEQUENTIAL DECISION MODELS IN RELIABILITY Interim Report, 1 Oct. 1982 - 30 Sep. 1983
B. L. Miller Jun. 1984 5 p
(Grant AF-AFOSR-0305-82)
(AD-A144181; AFOSR-84-0590TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Investigators studied the problem of the order in which to inspect a system to determine its state and the cause of its possible failure. Results to date are for a series system, and k types of inspections, k 1. This generalizes the direct search results of Matula and Stone where k is fixed at 1. The model also allows multiple inspections in the same period. Author (GRA)

N84-34955# Joint Publications Research Service, Arlington, Va.
INDUSTRIAL OPTODIGITAL INSPECTION SYSTEM
V. V. Vertoprakhov, S. V. Mikhlyayev, Yu. V. Chuguy, and V. P. Yunoshev *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 93-101 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 4, Jul. - Aug. 1983 p 53-59 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N84-34771*# Massachusetts Inst. of Tech., Cambridge.
PERIODIC CONTROL OF THE INDIVIDUAL-BLADE-CONTROL HELICOPTER ROTOR Ph.D. Thesis
Robert M. McKillip, Jr. Aug. 1984 192 p refs

(Grant NsG-2266)
(NASA-CR-166607; NAS 1.26:166607) Avail: NTIS HC A09/MF A01 CSCL 20K

Results of an investigation into methods of controller design for an individual helicopter rotor blade in the high forward-flight speed regime are described. This operating condition poses a unique control problem in that the perturbation equations of motion are linear with coefficients that vary periodically with time. The design of a control law was based on extensions to modern multivariate synthesis techniques and incorporated a novel approach to the reconstruction of the missing system state variables. The controller was tested on both an electronic analog computer simulation of the out-of-plane flapping dynamics, and on a four foot diameter single-bladed model helicopter rotor in the M.I.T. 5x7 subsonic wind tunnel at high levels of advance ratio. It is shown that modal control using the IBC concept is possible over a large range of advance ratios with only a modest amount of computational power required. Author

N84-34772# Aeronautical Research Labs., Melbourne (Australia).
MODELLING FOR FATIGUE CRACK GROWTH PREDICTION IN MIRAGE IIIO FRAME 26
J. M. Finney, F. G. Harris, R. A. Pell, C. S. Dentry, and C. T. Stefoulis Apr. 1984 74 p refs
(ARL-Struc-Rept-401; AR-003-015) Avail: NTIS HC A04/MF A01

Constant- and variable-amplitude fatigue crack growth data were obtained for A7-U4SG-T651 (2214) aluminum alloy applicable to frame 26 of Mirage IIIO aircraft, enabling calibration of computer models of crack growth. Of the four crack growth retardation models examined-Wheeler, Willenborg, modified Willenborg and Crack Closure-the Wheeler and modified Willenborg models are the most satisfactory but both require calibration by test. Even so, crack growth is not accurately predicted when the specimen geometry and the test sequence are varied from those used in calibrating the models. Apart from the crack growth models, the main sources of inaccuracy in predicting crack growth are the inadequacy of the growth rate basic data, incorrect assumptions of crack shape, and uncertainty in stress history. Thus, crack growth life may not be confidently predicted to better than a factor of two on actual life and, in some cases, the factor may be as high as ten. Author

N84-34773*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MIXED MODELS AND RECUGION TECHNIQUES FOR LARGE-ROTATION, NONLINEAR ANALYSIS OF SHELLS OF REVOLUTION WITH APPLICATION TO TIRES
Ahmed K. Noor (George Washington Univ.), Carl M. Andersen (Coll. of William and Mary), and John A. Tanner Oct. 1984 57 p refs
(Contract NCC1-40)
(NASA-TP-2343; L-15802; NAS 1.60:2343) Avail: NTIS HC A04/MF A01 CSCL 20K

An effective computational strategy is presented for the large-rotation, nonlinear axisymmetric analysis of shells of revolution. The three key elements of the computational strategy are: (1) use of mixed finite-element models with discontinuous stress resultants at the element interfaces; (2) substantial reduction in the total number of degrees of freedom through the use of a multiple-parameter reduction technique; and (3) reduction in the size of the analysis model through the decomposition of asymmetric loads into symmetric and antisymmetric components coupled with the use of the multiple-parameter reduction technique. The potential of the proposed computational strategy is discussed. Numerical results are presented to demonstrate the high accuracy of the mixed models developed and to show the potential of using the proposed computational strategy for the analysis of tires. Author

N84-34774*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Civil Engineering.
ON STRESS ANALYSIS OF A CRACK-LAYER Final Report
A. Chudnovsky, A. Dolgopolsky (Delaware Univ., Newark), and M. Kachanov (Tufts Univ., Medford, Mass.) Oct. 1984 95 p refs
(Grant NAG3-223)
(NASA-CR-174774; NAS 1.26:174774) Avail: NTIS HC A05/MF A01 CSCL 20K

This work considers the problem of elastic interaction of a macrocrack with an array of microcracks in the vicinity of the macrocrack tip. Using the double layer potential techniques, the solution to the problem within the framework of the plane problem of elastostatics has been obtained. Three particular problems of interest to fracture mechanics have been analyzed. It follows from analysis that microcrack array can either amplify or reduce the resulting stress field of the macrocrack-microcrack array system depending on the array's configuration. Using the obtained elastic solution the energy release rate associated with the translational motion of the macrocrack-microcrack array system has been evaluated. Author

N84-34775# IBM Research Lab., San Jose, Calif.
MEASUREMENT OF SMALL ELASTIC ANISOTROPY IN SOLIDS USING LASER INDUCED ULTRASONIC PULSES
A. C. Tam 8 Aug. 1984 14 p
(Contract N00014-83-C-0170)
(AD-A144296; RJ-4391; TR-12) Avail: NTIS HC A02/MF A01 CSCL 20/11

Nondestructive laser induced short ultrasonic pulse generation together with broadband detection are used to detect and measure the small elastic anisotropy in opaque solids quickly and precisely. This is demonstrated for extruded aluminum alloy type 6061-T6. A single laser-induced acoustic pulse propagation measurement over a path length of 47 mm provides a longitudinal ultrasonic velocity measurement accuracy of 0.02%. The longitudinal velocities at + or - 45 deg from the extruding direction Z are found to be 2% larger than the velocity along Z, indicating that most of the aluminum crystallities are oriented with a principal axis parallel to Z. Thermal annealing of the sample results in a small increase in ultrasonic velocity in all directions with the observed acoustic anisotropy remaining essentially unchanged. GRA

N84-34776# International Centre for Theoretical Physics, Trieste (Italy).
STEADY STATE CREEP IN QUARTZ
R. D. Baeta Dec. 1982 22 p refs Submitted for publication
(DE84-701196; IC-82/220) Avail: NTIS HC A02/MF A01

Recent creep data on quartz have been reanalyzed in terms of the stress dependence of dislocation mobility. The activation area for slip is found to be a strong function of stress, but weakly dependent on temperature. The activation area is not affected by the alpha-beta structural change in the crystal, and is the same for natural and synthetic samples. The activation energy, however, depends on the source of specimen, the alpha-beta structural phase change, and its stress dependence is weak or strong depending on the phase of the structure. The rate limiting step is attributed to kink formation in dislocations. Author

N84-34777# Joint Research Centre of the European Communities, Ispra (Italy).
EURDYN: COMPUTER PROGRAMS FOR THE NONLINEAR TRANSIENT ANALYSIS OF STRUCTURES SUBMITTED TO DYNAMIC LOADING. EURDYN (RELEASE 3) USERS' MANUAL
1983 154 p refs
(DE84-700988; EUR-8357) Avail: NTIS HC A08/MF A01

The EURDYN computer codes are mainly designed for the simulation of nonlinear dynamic response of fast-reactor components submitted to impulsive loading due to abnormal working conditions. The version documented herein has the following new features: (1) full large strain capability for 9-node isoparametric elements; (2) generalized array dimensions; (3) introduction of the radial return algorithm for elasto-plastic material modelling; (4) extension of the energy check facility to the case of prescribed displacements; and (5) possible interface to a post-processing package including time plot facilities. R.S.F.

N84-34778# Nuclear Power Group Ltd., Risley (England).
THE STRESS ANALYSIS OF A ROTATING CYLINDER EXPERIMENT TO DETERMINE CRACK GROWTH IN THICK SECTION STEEL
K. Reeding and A. M. Clayton Jun. 1983 24 p refs
(DE84-701733; ND-R-892(R)) Avail: NTIS HC A02/MF A01

The stress system of a rotating cylinder is compared to that of a pressure vessel. Suitable dimensions of the cylinder to obtain 2 mm of slow ductile tearing of a full length longitudinal starter crack on the inside wall, before net section yield occurs is specified. The results from a specially developed computer program to analyze the cylinder fracture behavior under thermal shock are described. It is shown that the rotating cylinder adequately reproduces the essential features of fracture in a large pressure vessel. DOE

N84-34492*# Barry Wright Corp., Burbank, Calif.
VIBRATION ISOLATION SYSTEM FOR TESTING IN A VACUUM
Jack Dankowski *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 320-339 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 20K

N84-34529# Joint Publications Research Service, Arlington, Va.
FATIGUE CRACK GROWTH IN VACUUM AND IN GASEOUS MEDIA Abstract Only
S. Ya. Yarema *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 49 Transl. into ENGLISH from Fiz.-Khim. Mekh. Material. (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 37-46 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34530# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF RATE OF GROWTH IN AQUEOUS CORROSIVE MEDIUM ON ELECTROCHEMICAL CONDITIONS AT TIP OF CRACK Abstract Only
V. V. Panasyuk, L. V. Ratych, and I. N. Dmytrakh *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 49-50 Transl. into ENGLISH from Fiz.-Khim. Mekh. Material. (Lvov), v. 19, no. 4, Jul. - Aug. 1983 p 33-37 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34541# Joint Publications Research Service, Arlington, Va.
PROCESSING THE RESULTS OF FATIGUE TESTING OF STRUCTURAL MATERIALS DAMAGED BY CORROSION Abstract Only
N. F. Boronkin, R. G. Gaynutdinov, A. V. Karlashov, A. M. Svintsitskiy, and A. A. Burdak *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 10 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Lvov, USSR), v. 19, no. 2, Mar. - Apr. 1983 p 83-86 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34545# Joint Publications Research Service, Arlington, Va.
DYNAMIC STRESS IN ELASTIC AREAS DEVELOPING UPON INTERACTION OF INTENSIVE HEAT FLUXES WITH SOLID BODIES Abstract Only
E. M. Kartashov, V. M. Nechayev, V. A. Shmakov, and G. M. Bartenev *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 13 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1983 p 29-38 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34550# Joint Publications Research Service, Arlington, Va.
PREDICTING FATIGUE DURABILITY OF DURALUMIN SPECIMENS Abstract Only
M. G. Petrov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 16 Transl. into ENGLISH from Probl. Prochnosti (Kiev), no. 6, Jan. 1983 p 22-24 Original language doc. previously announced in IAA as A83-39499 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34560# Joint Publications Research Service, Arlington, Va.
STUDY OF SPECIFICS OF FORMATION OF STRESS AND STRAIN IN MAKING CIRCULAR WELDED JOINTS IN ALUMINUM ALLOY ENVELOPES Abstract Only
L. M. Lobanov, V. I. Pavlovskiy, and B. S. Kasatkin *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 30 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 4, Apr. 1983 p 1-10 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-34561# Joint Publications Research Service, Arlington, Va.
COMPARATIVE ESTIMATE OF CYCLIC STRENGTH OF WELDED JOINTS IN TITANIUM ALLOYS Abstract Only
A. G. Grigoryants, Yu. B. Florinskiy, V. F. Moryakov, and Yu. N. Kvasha *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 30-31 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev), no. 4, Apr. 1983 p 16-18 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

N84-35041# National Chung Hsing Univ., Taichung (Taiwan).
ON THE SKOROHOD REPRESENTATION Abstract Only
Shey-Shiung Sheu *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 6 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35055# National Taiwan Univ., Taipei.
ANALYSIS OF FATIGUE CRACK PROPAGATION OF STRUCTURAL STEEL MEMBERS SUBJECTED TO VARIABLE AMPLITUDE FATIGUE STRESS Abstract Only
I-Chau Tsai *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 451-452 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35059# National Cheng Kung Univ., Tainan (Taiwan).
VIBRATIONS AND STABILITY OF THICK PLATES Abstract Only
Lien-Wen Chen *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 488-489 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35060# National Cheng Kung Univ., Tainan (Taiwan).
POST-BUCKLING OF INITIALLY STRESSED THICK PLATES Abstract Only
Lien-Wen Chen and Ji-Liang Doong *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 489 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35061# National Tsing Hua Univ., Hsinchu (Taiwan).
STRESS ANALYSIS OF FOAM SANDWICH SEMI-MONOCOQUE STRUCTURES Abstract Only
Ching-Cheng Chao *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 489-490 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35062# Chung Yuan Univ., Chung Li (Taiwan).
STABILITY ANALYSIS OF ELASTIC-PLASTIC RECTANGULAR PLATE WITH OPENING Abstract Only
Jeng-Sheng Huang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 491 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

42 GEOSCIENCES (GENERAL)

N84-35076# Joint Publications Research Service, Arlington, Va.
CURRENT CONCERNS IN FIELDS OF HYDROLOGY, METEOROLOGY
C. Diaconu *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 47-52 Transl. into ENGLISH from Stiinta si Tehnica (Bucharest), Jun. 1984 p 13-18 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N84-34779# Materials Research Labs., Melbourne (Australia).
EXTRACTS FROM SYMPOSIUM: COUNTERSURVEILLANCE 1983
May 1984 181 p refs Symp. held in Melbourne, 27-28 Apr. 1983
(MRL-R-921; AR-003-903) Avail: NTIS HC A09/MF A01

An overview is given of existing and projected surveillance techniques which are seen as a threat to be countered. The psychology of detection by humans machines is examined and countermeasures to thermal imagers are discussed including millimeter stealth technology. For individual titles, see N84-34780 through N84-34790.

N84-34780# Electronics Research Lab., Adelaide (Australia). Surveillance Systems Group.
MULTI-SENSOR SURVEILLANCE
D. G. Cartwright *In* Materials Research Lab. Extracts from Symp.: Countersurveillance 1983 May 1984 p 1-7 (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

The factors governing performance of a surveillance system are reviewed and some necessary trade-offs are considered. A number of examples of current systems is given. Future trends in surveillance are forecast. Only sensors for that part of the electromagnetic spectrum from 300 mm or 1 GHz (microwave) to 300 nm (near ultraviolet) are examined. A.R.H.

N84-34781# Materials Research Labs., Melbourne (Australia).
PASSIVE COUNTERSURVEILLANCE: AN OVERVIEW
P. J. Beckwith *In its* Extracts from Symp.: Countersurveillance 1983 May 1984 p 8-11 (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

The direction of current overseas passive countersurveillance research are assessed based on discussions at centers in the UK, and in the USA. The fields examined include traditional camouflage in the visible and near-IR based on background matching and disruptive patterning; radar signature reduction by means of coating or scattering nets; and passive thermal IR countermeasures using low-emissivity coatings and screening techniques. Overseas psychophysical research is mentioned although this field is still undeveloped. Author

N84-34782# Melbourne Univ., Parkville (Australia).
THE TIME IT TAKES TO SEE c52
G. Stanley and M. G. King (Defence Centre, Melbourne) *In* Melbourne Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 12-17 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

Although perception is experienced as immediate, considerable computation occurs on the input within our central nervous system. A distinction needs to be made between data-driven (bottom-up) and conceptually-driven (top-down) processes. These processes interact over time to determine our perception of people and objects. When the data are complex or incomplete the role of data-driven processes is lessened and conceptually-driven processing plays a greater role. Data-driven processes are relatively automatic, whereas conceptually-driven processes take more time to operate. Effective camouflage will weaken automatic processes and mislead conceptually-driven processes. Author

N84-34783# Materials Research Labs., Melbourne (Australia).
COGNITIVE PROCESSES IN TARGET ACQUISITION c52
C. J. Woodruff *In its* Extracts from Symp.: Countersurveillance 1983 May 1984 p 18-22 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

The need for a better understanding of cognitive processes is highlighted. Results of field trials assessing target acquisition performance and observers' expectations as to the major target cues to acquisition are presented. The structural relations between target features are noted, and proposals for experimental quantification of the role such relations play in acquisition are outlined. The application of the results of such work to both perceptual recognition training and camouflage design is described. Author

N84-34784# Defence Centre, Melbourne (Australia).
DETECTING CAMOUFLAGED TARGETS: THEORY INTO PRACTICE c52
Michael G. King and Gordon Stanley (Melbourne Univ.) *In* Materials Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 23-32 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

Some predictions are taken from visual information processing theory with regard to expected performance in the task of camouflage detection. The dichotomy of serial processing/automatic detection is discussed in the light of experimental results. It is concluded that serial processes are usually required for the detection of a camouflaged target. A corollary of this is the implication that a single critical feature probably does not exist for typical camouflaged targets. From these experimental results, further issues are generated: (1) that the task of camouflage can be operationally defined as the retardation of the detection processes; (2) that the experimental protocol of published camouflage assessment trials should be re-evaluated in the light of the present propositions; and (3) that visual search instructions given to soliders in the field may be modified to take account of the time it takes to see. Author

N84-34785# Materials Research Labs., Melbourne (Australia).
DEVELOPMENT OF TEXTURE DESCRIPTIONS FOR IMAGES c74
C. J. Woodruff *In its* Extracts from Symp.: Countersurveillance 1983 May 1984 p 42-47 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

The functioning of visual disruptors is clarified, and the need for quantification of texture detailed. A procedure is described which will allow determination of the dimensions of perceived texture similarity. An approach to determining optimal mathematical descriptors of perceived texture similarity is described, and applications of such a mathematical description are briefly outlined. Author

N84-34786# Weapons Systems Research Lab., Adelaide (Australia). Weapon Systems Div.
AUTONOMOUS SURVEILLANCE IN THE VISUAL SPECTRAL REGION c74
B. E. Furby and B. D. Roney *In* Materials Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 48-68 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

An autonomous surveillance system is one which is capable of detection, identification, and tracking of fast targets in real time. The equipment needed to carry out these operations includes a TV camera, digitizer and a digital computer. The design of the computer hardware and the development of the software are very difficult because several Mbits of data must be processed in real time. At present suitable algorithms are being evaluated for the identification and tracking of ship targets and the results of the two techniques developed are described. Fourier descriptors provide a method of identification which can be superior to the human operator and real time correlation tracking methods are approaching useful times by reducing the number of points in the window. Author

N84-34787# Materials Research Labs., Melbourne (Australia).
THE THEORY OF FOURIER DESCRIPTORS AND HOW THEY MAY BE USED TO CHARACTERIZE SHAPE c64
In its Extracts from Symp.: Countersurveillance 1983 May 1984 7 p refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

A pair of Fourier equations is given for transforming from the space domain to the frequency domain and back again in order to characterize the shape of the two dimensional images of targets. If the complex coordinates of the contour are inserted for certain values in the discrete Fourier transformation, starting at any point and proceeding in a counterclockwise direction around the contour, the contour is then characterized by a set of coefficients in the frequency domain. This set of coefficients is the Fourier descriptor of shape. Translation, magnification, rotation, and contour starting point are discussed as well as the building up of synthetic shapes. A.R.H.

N84-34788# Electronics Research Lab., Adelaide (Australia).
OPTICAL PROCESSING, ITS ROLE IN SURVEILLANCE c74
D. G. Nichol *In* Materials Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 69-72 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

The major attraction of coherent optics, from an image processing viewpoint, is the ability of such an optical system to perform two dimensional Fourier transforms (practically) instantaneously. Clearly these transformations have many applications in the automatic processing of surveillance pictures (target recognition, target tracking, texture analysis and topographic feature extraction). Limitation which led to delays in the implementation of optical processing in practical systems include the problem of getting data into and out of the system, a certain lack of flexibility in processing techniques, and the cumbersome but sensitive nature of optical processors. Techniques to overcome most of these problems include recyclable spatial light modulators, CCD arrays, holographic optical elements and the hybrid optical digital processor. A system being developed which incorporates many of these principles is described. Examples of the processing of surveillance type images are given. Author

N84-34789# Materials Research Labs., Melbourne (Australia).
TWO APPROACHES TO THE INSTRUMENTAL ESTIMATION OF DETECTABILITY c74
D. R. Skinner and P. J. Beckwith *In its* Extracts from Symp.: Countersurveillance 1983 May 1984 p 94-98 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

Two different approaches are described to the problem of making a compact, portable device for the instrumental estimation, under combat field conditions, of visibility or detectability close to threshold. One instrument is a simplified veiling-glare visibility meter designed as an attachment to an SLR camera, and the other uses a novel technique for image spreading. Early experimental results are available for the former, and appear to be consistent with predictions. It is intended to establish which type of instrument provides the better correlation with detectability derived from multiple observer trials. Author

N84-34790# Materials Research Labs., Melbourne (Australia).
MILLIMETRE WAVES: A PROBLEM FOR THE FUTURE c32
R. C. McLeary and B. C. H. Wendlandt *In its* Extract from Symp.: Countersurveillance 1983 May 1984 p 99-102 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

An optically-pumped millimeter-wave laser is described. Some of the proposed activities within the countersurveillance area for which the laser source is required are also presented. Physical means of absorbing millimeter waves by materials are also briefly discussed. Some areas of countersurveillance technology in the millimeter-wave domain pertinent to expertise available in Physics Division of the Materials Research Laboratories are outlined. Author

N84-34791# Oregon State Univ., Corvallis. Dept. of Atmospheric Sciences.
A BOUNDARY LAYER PARAMETERIZATION FOR A GENERAL MODEL Final Report, 1 Jul. 1981 - 31 Dec. 1983
L. Mahrt, H. Pan, J. Paumier, and I. Troen Mar. 1984 192 p (Contract F19628-81-K-0046)
(AD-A144224; AFGL-TR-84-0063) Avail: NTIS HC A09/MF A01 CSCL 08/13

A two-layer model of soil hydrology is developed from the basic soil moisture transport equations. The thin upper layer responds to short term evaporation. A thick lower layer includes the root zone and longer term water storage. The model is tested against a high-resolution soil hydrology model. Simple transpiration and canopy interception models are also included in the surface water budget. A surface energy balance is employed. Fluxes from the surface to the atmosphere are formulated with a stability-dependent bulk aerodynamic relationship and a stability dependent Penman relationship. The latter is evaluated with the Wangara data set. The model of the atmospheric boundary layer uses a stability-dependent, height dependent eddy diffusivity which provides for countergradient convective transport. Boundary layer growth is modelled with a bulk Richardson number which is generalized to include purely convective boundary layer growth. The model development emphasizes self-consistency and reduction of the number of velocity scales compared to previous models of this type. GRA

N84-34736# Deutsches Geodaetisches Forschungsinstitut, Munich (West Germany).
ACCURACY REQUIREMENTS OF SPACE LASER SYSTEMS FOR GEODETIC APPLICATIONS
R. J. Cuno *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34742# Technische Hogeschool, Delft (Netherlands). Dept. of Geodesy.
SPACE/AIRBORNE LASER RANGING (SALR) AS COMPLEMENT TO GROUNDBASED TRANSPORTABLE SATELLITE LASER RANGING (SLR)
B. H. W. vanGelder and L. Aardoom *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34749# Hull Univ. (England).
THE USE OF TEA AND MULTIATMOSPHERE CO2 LASERS IN ACTIVE REMOTE SENSING
J. W. vanDijk, J. F. Kusters, A. Layfield, and B. J. Rye *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs Sponsored by UK Department of Trade and Industry, UK Science and Engineering Research Council and CEC Directorate General for Science (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-35039# National Science Council, Taipei (Taiwan).
REMOTE SENSING OF COASTAL ENVIRONMENT: THE ESTUARINE PROCESSES OF TA-TU RIVER Abstract Only

Jhy-Ming Lu (ITRI) *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 4 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35042# National Central Univ., Chung-Li (Taiwan).
A STUDY OF MULTISPECTRAL MODEL OF LAND COVER Abstract Only
Hsien-Ta Wang and Jer-Jinum Chen *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 9 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35050# National Taiwan Univ., Taipei.
PRELIMINARY STUDY OF LANDSAT IMAGERIES OF TAIWAN AND ITS SURROUNDINGS Abstract Only
Yeun-An Fan *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 56 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-34551# Joint Publications Research Service, Arlington, Va.
FAR NORTH AS SOURCE OF NONFERROUS METALS
P. Lomako *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 17-20 Transl. into ENGLISH from Sots. Industriya (Moscow), 18 May 1983 p 2 (For primary document see N84-34533 24-23)
Avail: NTIS HC A04/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N84-34792* National Aeronautics and Space Administration. Pasadena Office, Calif.
SALTLESS SOLAR POND Patent
Edward I. H. Lin, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 11 Sep. 1984 10 p Filed 28 May 1982 Supersedes N82-29714 (20 - 20, p 2849) Sponsored by NASA (NASA-Case-NPO-15808-1; NAS 1.71:NPO-15808-1; US-Patent-4,470,403; US-Patent-Appl-SN-383068; US-Patent-Class-126-415; US-Patent-Class-4-498) Avail: US Patent and Trademark Office CSCL 10A

A solar pond adapted for efficiently trapping and storing radiant solar energy without the use of a salt concentration gradient in the pond is disclosed. A body of water which may be fresh, saline, relatively clear or turbid, is substantially covered by a plurality of floating honeycomb panels. The honeycomb panels are made of a material such as glass which is pervious to short wave solar radiation but impervious to infrared radiation. Each honeycomb panel includes a multitude of honeycomb cells. The honeycomb panels are divided into the elongated honeycomb cells by a multitude of intermediate plates disposed between a bottom plate and top plate of the panel. The solar pond is well suited for providing hot water of approximately 85 to 90 C temperature for direct heating applications, and for electrical power generation.
Official Gazette of the U.S. Patent and Trademark Office

N84-34793*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIATION EFFECTS IN SILICON AND GALLIUM ARSENIDE SOLAR CELLS USING ISOTROPIC AND NORMALLY INCIDENT RADIATION
B. E. Anspaugh and R. G. Downing 1 Sep. 1984 74 p refs Sponsored in part by AFWAL
(NASA-CR-174007; JPL-Pub-84-61; NAS 1.26:174007) Avail: NTIS HC A04/MF A01 CSCL 10A

Several types of silicon and gallium arsenide solar cells were irradiated with protons with energies between 50 keV and 10 MeV at both normal and isotropic incidence. Damage coefficients for maximum power relative to 10 MeV were derived for these cells for both cases of omni-directional and normal incidence. The damage coefficients for the silicon cells were found to be somewhat lower than those quoted in the Solar Cell Radiation Handbook. These values were used to compute omni-directional damage coefficients suitable for solar cells protected by coverglasses of practical thickness, which in turn were used to compute solar cell degradation in two proton-dominated orbits. In spite of the difference in the low energy proton damage coefficients, the difference between the handbook prediction and the prediction using the newly derived values was negligible. Damage coefficients for GaAs solar cells for short circuit current, open circuit voltage, and maximum power were also computed relative to 10 MeV protons. They were used to predict cell degradation in the same two orbits and in a 5600 nmi orbit. Results show the performance of the GaAs solar cells in these orbits to be superior to that of the Si cells. R.S.F.

N84-34794# Pacific Northwest Lab., Richland, Wash.
ROTATIONALLY SAMPLED WIND CHARACTERISTICS AND CORRELATIONS WITH MOD-OA WIND TURBINE RESPONSE
R. L. George and J. R. Connell Sep. 1984 74 p refs
(Contract DE-AC06-76RL-01830)
(PNL-5238) Avail: NTIS HC A04/MF A01

Results of a comprehensive wind and wind turbine measurement program, the Clayton, New Mexico, vertical plane array/MOD-OA project, are presented. The turbulent wind was measured for a large array of fixed anemometers and wind turbine response parameters were also measured. Computer-produced time series of rotationally sampled winds and wind turbine blade bending moments and power were converted to frequency spectra. These spectra were used as the basis for both qualitative and quantitative comparisons among the various cases. A quantitative comparison between the rotationally sampled wind input and blade bending response was made, using the Fourier spectra to estimate the blade transfer function. These transfer functions were then used to calculate an approximate damping coefficient for the MOD-OA fiberglass blade. R.S.F.

N84-34795*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SAN MARCO D/L SOLAR ARRAY SYSTEM DESIGN AND PERFORMANCE
Maurizio DiRuscio (Rome Univ., Italy), Alessandro Agneni (Rome Univ., Italy), and John H. Day, Jr. Jun. 1984 35 p refs
(NASA-TM-86125; NAS 1.15:86125) Avail: NTIS HC A03/MF A01 CSCL 10A

The design and performance of the solar array system for the San Marco D/L spacecraft is described in detail. The solar array system design is shown to be suitable for spacecraft which have elastically sensitized outer surfaces to measure aerodynamic forces. However, the performance of this solar array system is shown to be at least 30 percent less efficient than conventional spacecraft solar array designs. An on-board experiment to compare the in-flight performances of Si and GaAs solar cell panels is also described. Preflight performance data show that at beginning-of-life, air mass zero solar illumination, 28 C and peak power output the Si panels are at last 20 percent less efficient than the GaAs panels. Author

N84-34796# IAP Research, Inc., Dayton, Ohio.
PULSED INDUCTIVE ENERGY STORE Final Report, Jul. 1982 - Jan. 1984
D. E. Johnson and J. P. Barber Wright-Patterson AFB, Ohio AFWAL May 1984 67 p
(Contract F33615-82-C-2224)
(AD-A144282; IAP-TR-83-5; AFWAL-TR-84-2031) Avail: NTIS

HC A04/MF A01 CSCL 10/2

The objective of this program was to evaluate the technical feasibility of coaxial toroidal coils as high current pulsed energy storage inductors. The program included an analytic investigation, and the design, fabrication and testing of a cryogenically cooled coaxial toroidal coil. The most promising concept investigated was a multiturn sectored inductor constructed by arranging several pancake coils (sectors) so that they approximate a toroid and connecting the coils electrically in parallel. GRA

N84-34797# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.

SOLAR THERMAL PROPULSION: AN INVESTIGATION OF SOLAR RADIATION ABSORPTION IN A WORKING FLUID Final Report, 9 Jan. - 15 Apr. 1984

F. J. Perry Jun. 1984 76 p

(AD-A144294; AFRPL-TR-84-032) Avail: NTIS HC A05/MF A01 CSCL 10/1

The objective of this solar thermal propulsion study was to examine the state of the science of direct absorption of solar radiation into a working fluid for use in propulsive devices. In particular, the absorption characteristics of alkali seeded hydrogen gas were investigated. Because of obvious parallels, the laser propulsion literature was reviewed as well as the solar propulsion literature. The investigation also covered peripheral areas such as aerodynamic windows and alkali/hydrogen mixing techniques. This report presents the important details from the existing information with an extensive list of references included. Recommendations for future theoretical and experimental Air Force research were made based upon the data uncovered. Topics addressed include: Absorption Coefficients, Solar Radiation Absorption, Hydrogen-Alkali Absorption, Laser Propulsion, and Aerodynamic Windows. GRA

N84-34552# Joint Publications Research Service, Arlington, Va.

USE OF CONCENTRATED SOLAR ENERGY TO FORM SLIP COATINGS Abstract Only

A. A. Korol, Ye. A. Korol, I. Ye. Kasich-Pilipenko, P. A. Verkhovodov, V. S. Dvornyakov, and V. Kh. Kadyrov *In its* USSR Rept.: Mater. Sci. and Met., No. 91 (JPRS-84129) 16 Aug. 1983 p 21 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 4, Apr. 1983 p 39-42 (For primary document see N84-34533 24-23)

Avail: NTIS HC A04/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N84-34798# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

AN EXPERIMENTAL APPROACH TO EVALUATING ENVIRONMENTAL DEGRADATION MECHANISMS IN BISPHENOL-A POLYCARBONATE FILMS ON METALLIC SUBSTRATES

John D. Webb Nov. 1983 120 p refs

(Contract DE-AC02-83CH-10093)

(SERI/TR-255-1602) Avail: NTIS HC A06/MF A01

A technique is presented for in situ study of degradative changes in bisphenol-A polycarbonate (BPA-PC) coatings on metallic substrates. The technique uses a controlled environmental exposure chamber in conjunction with a Fourier transform infrared spectrophotometer. The chamber design permits collection of infrared reflection-absorbance (IR-RA) spectra from a sample undergoing exposure to controlled ultraviolet radiation, gas mixtures, and temperatures. A technique of relating the IR-RA band heights measured with the apparatus to the concentration of polymeric functional groups and reaction products in the coatings is presented. Comparison of the results of UV and IR spectroscopy with those obtained using gel permeation chromatography to determine changes in the molecular weight distribution of the BPA-PC films following exposure enabled identification of several degradation pathways. The major mechanisms, in order of importance, appear to be the first and second photo-Fried rearrangements at carbonyl, and chain scission, also at carbonyl. The quantum yield of the first photo-Fries reaction product, measured using IR-RA, was 0.020 + or - 0.004. Some evidence for photooxidation of the BPA-PC methyl functional groups is also presented. The techniques presented should be applicable to the study of both surface and interfacial degradation, especially with samples having polymer film thicknesses within the optimum range (0.1 to 1.0 microns). Author

N84-34799# Little (Arthur D.), Inc., Cambridge, Mass.

METHODS FOR ESTIMATING PHYSICOCHEMICAL PROPERTIES OF INORGANIC CHEMICALS OF ENVIRONMENTAL CONCERN Final Report, Sep. 1983 - Sep. 1984 on Phase I

W. J. Lyman, B. M. Barnett, J. B. Berkowitz, I. Bodek, and M. Bonazountas Jun. 1984 120 p

(Contract DAMD17-83-C-3274; DA Proj. 3E1-62720-A-835)

(AD-A144154; ADL-C-50075) Avail: NTIS HC A06/MF A01 CSCL 13/2

This study was the first phase of a program designed to produce (in Phase 2) a handbook which will provide information, including descriptions of calculational procedures or estimation methods, on environmentally important properties of inorganic and organometallic chemicals. The Phase 1 program evaluated the state-of-knowledge in this area and also assessed the capabilities and probable needs of environmental scientists and managers for guidance in this area. Outside experts were used in this process. This Phase 1 report provides a detailed outline and discussion of the handbook to be prepared in Phase 2. Author (GRA)

N84-34800# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.

THE HIGH ALTITUDE POLLUTION PROGRAM (1976 - 1982) Final Report

N. Sundararaman Jan. 1984 139 p

(AD-A144390; FAA/EE-84-10) Avail: NTIS HC A07/MF A01 CSCL 13/2

The High Altitude Pollution Program (HAPP) was initiated by the Federal Aviation Administration in 1976 in order to assess the effects of aircraft engine emissions on the upper atmosphere. Its predecessor, the Climatic Impact Assessment Program (1971-1975) conducted by the U.S. Department of Transportation, focused international attention on the ozone depletion problem. This final report documents the conclusions of the studies funded by HAPP from 1976 until the program was terminated in 1982. Scientific considerations of the impacts of aircraft engine emissions on the stratosphere and troposphere are discussed. Major HAPP accomplishments in the areas of engine emissions, laboratory studies, field measurements, and modeling are summarized. Current evaluations of the effects of aircraft engine NOx emissions (through 1984) are also contained in the report. Based upon the studies undertaken, it appears that there is no immediacy of concern with regard to ozone and climatic changes that may result from the operations of civilian aircraft at this time. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N84-34801 California Univ., Los Angeles.

PETROLOGY OF BASEMENT ROCKS OF THE CALIFORNIA CONTINENTAL BORDERLINE AND THE LOS ANGELES BASIN Ph.D. Thesis

Sorena Svea Sorensen 1984 447 p

Avail: Univ. Microfilms Order No. DA8413681

A unit of amphibolite facies metasediments, basaltic to gabbroic metabasites, and serpentinized ultramafite in the Catalina

Schist is discussed. Some basaltic inclusions in the ultramafite have rinds, formed at T > 600 C and P = 8 to 12 kb by metasomatism between amphibolitized eclogite and unserpentinized periodotite. The petrology of blueschists and greenschists from the Catalina Schist is compared. A blueschist melange contains variably deformed blocks, most with lawsonite + glaucophane bearing assemblages; the greenschist unit comprises grayschist, quartz achist and metabasite schist. Plutonites, metavolcanics, and metasediments from Santa Cruz Island and the Santa Monica Mountains are described. The plutonic and metavolcanic rocks are calc alkaline. Regional metamorphism of greenschist facies, chlorite to biotite zone is overprinted by amphibolite facies and lower staurolite zone contact metamorphism in the aureoles of silicic plutonites. Dissert. Abstr.

N84-34802 California Univ., Berkeley.
CRUSTAL SHEAR VELOCITY MODELLING IN NEVADA: A STUDY OF BROADBAND MULTI-MODE SURFACE WAVES Ph.D. Thesis
Kin-Yip Chun 1983 157 p
Avail: Univ. Microfilms Order No. DA8413347

Pure path group velocities of Rayleigh and Love waves in the period range 3 to 50 seconds have been measured to determine a model of the fine crustal shear velocity structure within approximately a 400 kilometer radius of the Nevada Test Site (NTS). The measured group velocities, determined using the phase-matched filter (PMF) method to eliminate multipathing, represent the lowest observed within the Basin and Range. The main features of the models derived from the observed dispersion data are: (1) an average crustal thickness of 28 kilometers; (2) a low average crustal shear velocity of 3.55 km/sec; (3) a shallow crustal low velocity zone (LVZ) in the depth range 7.3 to 13.8 kilometers; (4) a bottom crustal layer 7 to 10 kilometers thick with a shear velocity of 3.70 to 3.90 km/sec; and (5) a low shear velocity of 4.36 km/sec in the upper mantle. The derived models are path-dependent. The velocity structure differences are found to correlate with the distributions of heat flows subprovinces. The main features of the regional shear wave attenuation structure are: (1) an average shear wave quality factor Q sub S of about 207 in the topmost 7.3 km; and (2) an underlying, broad zone with an anomalously low Q sub S of 37. A single, horizontally layered earth model is found inadequate to explain simultaneously the observed Rayleigh and Love wave dispersion data along any propagation paths. Dissert. Abstr.

N84-34803 Columbia Univ., New York.
SOME BOUNDARY INTEGRAL EQUATION METHODS AND THEIR APPLICATION TO SEISMIC EXPLORATION Ph.D. Thesis
Gerard Thomas Schuster 1984 148 p refs
Avail: Univ. Microfilms Order No. DA8413026

Efficient Boundary Integral Equation (BIE) methods are developed and tested against some forward modeling problems in geophysics. The two dimensional Helmholtz equation can be extended to the elastodynamic equation as well as three dimensional media. As a result of BIE schemes derived and compared to previously used BIE schemes, a widely used asymptotically unstable scheme gave more accurate, efficient and stable solutions than little known stable schemes. Two interactive modeling schemes based on perturbing the BIE and solving the perturbed equation by a Born Series are developed. For multibody interactive modeling this hybrid approach can require up to several orders of magnitude fewer computations than pure BIE methods. The Generalized Born Series computes the Green's functions of individual scatters by BIE's and then couples their interactions together via the Born Series. Dissert. Abstr.

N84-34804 Yale Univ., New Haven, Conn.
STRAIN RELEASE ALONG OCEAN TRANSFORM FAULTS Ph.D. Thesis
Lisa Maureen Stewart 1983 293 p
Avail: Univ. Microfilms Order No. DA8413124

A global study of the nature of seismic rupture along oceanic transform faults (TFs) is presented, and many aspects of fault behavior and Mid-Ocean Ridge processes are discussed. A classification of TF earthquakes is developed based on their relative excitation of short period body waves to long period surface waves. Since the ways in which transform faults release their accumulated strain varies, for more than 50 earthquakes occurring on 30 TFs since 1963 form the database for a comparison of rupture processes. The variation of TF rupture processes is not related to spreading rate or TF offset. A study of seismicity of the Eltanin Fracture Zone system shows that unlike many TFs, the Eltanin FZ realizes more than 90% of its slip aseismically. This identifies a major portion of plate boundary whose motion persists undetected by seismic instruments. The global variations in rupture patterns are discussed in terms of current models of fault behavior. The versatility of the asperity model accommondates the entire range of observed patterns. Variations in physical properties within TF contact zones (asperities) are documented in the petrology and geochemistry of rocks from ophiolite sections and TFs.
Dissert. Abstr.

N84-34805# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
VERTICAL MODE DECOMPOSITION AND MODEL RESOLUTION
Pedro Leite daSilvaDias and Jose Paulo Bonatti Aug. 1984 26 p refs Submitted for publication
(INPE-3230-PRE/580) Avail: NTIS HC A03/MF A01

The sensitivity of the vertical mode expansion to the location of the upper boundary of the model atmosphere and to the vertical resolution is studied. The vertical modes are determined using a sigma-coordinate linearized primitive equation model with basic state at rest. The sigma-levels are defined at standard pressure levels so as to avoid interpolation influences on the results. Two basic sets of experiments are performed: (1) varying the top prressure where sigma is zero while maintaining the vertical resolution in the interior unchanged; (2) fixing the top pressure and varying the vertical resolution. The results are analysed in terms of the energetics of the projection of gridded FGGE level III-b data one particular grid point over tropical South America during the summer. The peak energy which occurs at an equivalent depth of the order of 220 m is approximately invariant with respect to experiments 1 and 2. Author

N84-34806# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LARGE SCALE TROPICAL HEAT SOURCES AND GLOBAL ATMOSPHERIC ENERGY PROPAGATION ASSOCIATED WITH DROUGHTS IN NORTHEAST BRAZIL
Paulo Nobre and Antonio Divino Moura Aug. 1984 6 p refs Presented at the WMO Symp. on Meteorological Aspects of Tropical Droughts, Fortaleza, 24-28 Sep. 1984
(INPE-3227-PRE/578) Avail: NTIS HC A02/MF A01

An analysis of the monthly departure of the relative vorticity field (zeta) over the globe and monthly departures of the sea surface temperature (SST) in the Tropical Atlantic Ocean is performed for years of droughts and floods over Northeast Brazil, in the period from 1963 to 1980. Planetary scale wavelike patterns were observed in the zeta field similar to those found in previous theoretical and observational studies. Of major interest, it is the phase coherence of the wavelike patterns of circulation anomalies over the Northern hemisphere and the precipitation regime over Northeast Brazil. Such phase coherence, in addition to the occurrence of SST anomalies in the Tropical Atlantic Ocean (with warmer waters in the north and colder in the south of the equator for drought years, and the reverse for flood years), indicates that the existence of global scale wavelike patterns in zeta field, as well as the precipitation regime over Northeast Brazil are, respectively, the remote and local response of the atmosphere to a tropical thermal forcing. Author

N84-34807*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LARGE-SCALE, NEAR-EARTH, MAGNETIC FIELDS FROM

EXTERNAL SOURCES AND THE CORRESPONDING INDUCED INTERNAL FIELD

R. A. Langel and R. H. Estes Apr. 1983 44 p refs
(NASA-TM-85012; NAS 1.15:85012) Avail: NTIS HC A03/MF A01 CSCL 08E

Data from MAGSAT analyzed as a function of the Dst index to determine the first degree/order spherical harmonic description of the near-Earth external field and its corresponding induced field. The analysis was done separately for data from dawn and dusk. The MAGSAT data was compared with POGO data. A local time variation of the external field persists even during very quiet magnetic conditions; both a diurnal and 8-hour period are present. A crude estimate of Sq current in the 45 deg geomagnetic latitude range is obtained for 1966 to 1970. The current strength, located in the ionosphere and induced in the Earth, is typical of earlier determinations from surface data, although its maximum is displaced in local time from previous results. R.S.F.

N84-34808*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

GEOPHYSICAL INTERPRETATION OF SATELLITE LASER RANGING MEASUREMENTS OF CRUSTAL MOVEMENT IN CALIFORNIA

Steven C. Cohen Aug. 1984 27 p refs Submitted for publication
(NASA-TM-86148; NAS 1.15:86148) Avail: NTIS HC A03/MF A01 CSCL 08K

As determined by satellite laser ranging the rate of contraction of a 900 kilometer baseline between sites located near Quincy in northern California and San Diego in southern California is about 61 to 65 mm/yr with a formal uncertainty of about 10 mm/yr. The measured changes in baseline length are a manifestation of the relative motion between the North America and Pacific tectonic plates. This long baseline result is compared to measurements made by more conventional means on shorter baselines. Additional information based on seismicity, geology, and theoretical modelling is also analyzed. Deformation lying within a few tens of kilometers about the major faults in southern California accounts for most, but not all of the observed motion. Further motion is attributable to a broader scale deformation in southern California. Data suggesting crustal movements north of the Garlock fault, in and near the southern Sierra Nevada and local motion at an observatory are also critically reviewed. The best estimates of overall motion indicated by ground observations lie between 40 and 60 mm/yr. This lies within one or two standard deviations of that deduced by satellite ranging but the possibility of some unresolved deficit cannot be dismissed. The long time scale RM2 plate tectonic model of Minster and Jordan predicts a contraction between 47 and 53 mm/yr depending on the extension rate of the Basin and Range. Thus the ground based observations, satellite laser ranging (SLR) results, and RM2 rates differ at about the 10 mm/yr level and are consistent with one another within the data and model uncertainties. Author

N84-34809*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ANDEAN TECTONICS: IMPLICATIONS FOR SATELLITE GEODESY

R. J. Allenby Sep. 1984 43 p refs
(NASA-TM-86160; NAS 1.15:86160) Avail: NTIS HC A03/MF A01 CSCL 08G

Current knowledge and theories of large scale Andean tectonics as they relate to site planning for the NASA Crustal Dynamics Program's proposed high precision geodetic measurements of relative motions between the Nazca and South American plates are summarized. The Nazca Plate and its eastern margin, the Peru-Chile Trench, is considered a prototype plate marked by rapid motion, strong seismicity and well defined boundaries. Tectonic activity across the Andes results from the Nazca Plate subducting under the South American plate in a series of discrete platelets with different widths and dip angles. This in turn, is reflected in the tectonic complexity of the Andes which are a multitutde of orogenic belts superimposed on each other since the Precambrian. Sites for Crustal Dynamics Program measurements are being located to investigate both interplate and extraplate motions. Observing operations have already been initiated at Arequipa, Peru and Easter Island, Santiago and Cerro Tololo, Chile. Sites under consideration include Iquique, Chile; Oruro and Santa Cruz, Bolivia; Cuzco, Lima, Huancayo and Bayovar, Peru; and Quito and the Galapagos Islands, Ecuador. Based on scientific considerations, Santa Cruz, Huancayo (or Lima), Quito and the Galapagos Islands should be replaced by Isla San Felix, Chile; Brazilia or Petrolina, Brazil; and Guayaquil, Ecuador. If resources permit, additional important sites would be Buenaventura and Villavicencio or Puerto La Concordia, Colombia; and Mendoza and Cordoba, Argentina. Author

N84-34810# Utah State Univ., Bedford, Mass. Radiance Lab.

ATMOSPHERE TEMPERATURE PROFILE RECOVERY USING PARTIAL INTERFEROMETRY

M. H. Bruce and C. W. Eastman Hanscom AFB, Mass. AFGL 30 Sep. 1983 93 p
(Contract F19628-83-C-0056)
(AD-A144196; SDL-SRL-83-2; AFGL-TR-83-0317; SR-1) Avail: NTIS HC A05/MF A01 CSCL 04/1

A model for the radiative transfer of CO2 at 15 microns through representative earth atmospheres is constructed in order to investigate the efficiency of temperature profile recovery using selected partial interferograms. The recovered profiles and their root mean square errors are then compared in order to evaluate the apparent advantage in using partial interferometry. GRA

N84-34811# Logicon, Inc., Lexington, Mass.

ANALYSIS AND PROGRAMMING FOR RESEARCH IN THE PHYSICS OF THE UPPER ATMOSPHERE Final Scientific Report, 1 Oct. 1982 - 30 Sep. 1983

J. N. Bass and F. R. Roberts 1 Feb. 1984 90 p
(Contract F19628-80-C-0175)
(AD-A144203; LSIS-84156-ESD-001) Avail: NTIS HC A05/MF A01 CSCL 04/1

Studies are available in the literature for evaluating local time variations of the density of the atmosphere imparted by tidal effects. Methods are reported here for incorporating the results of these analyses into easily computed formulations of the dependence on local time of the temperature and density. The Jacchia-Bass density model was modified to simplify calculations by excluding from consideration those minor constituents whose total contribution to the mass density is less than 1%. Software was developed to support studies of atmospheric density variations based on data collected by satellite-borne accelerometers. Modifications were made to several standard satellite ephemeris codes. The changes include: (1) adaptation of the imbedded atmospheric density model to extend its validity to cases of extremely high solar activity; and (2) improvement in the accuracy of conversion between mean Keplerian elements and position/velocity vectors. An HF ducted mode of propagation is to be supported using artificial ionospheric irregularities. One terminal is to be ground-based; the other, satellite-borne. GRA

N84-34812*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.

PATH INTEGRATED GROWTH OF AURORAL KILOMETRIC RADIATION Progress Report

N. Omidi and D. A. Gurnett Feb. 1984 50 p
(Grant NGL-16-001-043; Contract N00014-76-C-0016)
(NASA-CR-173995; NAS 1.26:173995; AD-A144336; U-OF-IOWA-84-9) Avail: NTIS HC A03/MF A01 CSCL 20M

Using Poeverlein's graphical method, three dimensional ray path calculations are performed to evaluate the path-integrated growth of auroral kilometric radiation (AKR). The ray tracing results indicate that waves whose initial wave vector lie in the local meridian plane continue to propagate in that plane and that among these waves, those with frequencies near the cutoff frequency (f sub R = 0) refract substantially, where as those with frequencies well above the cutoff frequency suffer little refraction. It is also shown that waves whose initial wave vector lie outside of the

local meridian plane propagate in the longitudinal as well as the radial and the latitudinal directions. The refraction of these waves is also highly dependent upon the wave frequency, i.e., waves with frequencies near f sub R = 0 refract substantially, whereas waves with frequencies much above f sub R = 0 undergo little refraction. In order to test the electron cyclotron maser mechanisms as a method for generation of AKR, a typical electron distribution function measured in the auroral zone by the S3-3 satellite, is used to calculate path-integrated growths of representative rays. The results of this study indicate that electron distribution functions like those measured by the S3-3 satellite are not capable of amplifying coarnic noise background to the observed intensities of auroral kilometric radiation, and that much steeper slopes at the edges of the loss cone are required. GRA

N84-34813# Science Applications, Inc., McLean, Va.
RESEARCH AND DEVELOPMENT SUPPORT FOR THE CENTER FOR SEISMIC STUDIES Quarterly Technical Report, 1 Jan. - 30 Jun. 1984
C. F. Romney, L. Huszar, and G. A. Frazier 15 Jul. 1984 44 p (Contract MDA903-84-C-0020)
(AD-A144442; SAI-84/1305) Avail: NTIS HC A03/MF A01 CSCL 08/11

Work during the second and third quarters of FY1984 continued to be focused on the development of the Center for Seismic Studies, and on planning and developments to prepare for a test of Seismic data exchange and event determination, as proposed by the group of Scientific Experts, UN Committee on Disarmament. A help system was designed and partially completed, and other aids for new users of the Center's data and facilities were developed. An introduction to Ingres was prepared, and new experimental data bases were installed. Author (GRA)

N84-34814# Weidlinger Associates, Menlo Park, Calif.
LARGE-SCALE NUMERICAL ANALYSIS OF THREE-DIMENSIONAL SEISMIC WAVES Final Report, 1 Oct. 1982 - 30 Sep. 1983
G. L. Wojcik and D. K. Vaughan 31 May 1984 53 p (Contract F49620-82-C-0002)
(AD-A144610; R-8403; AFOSR-84-0691TR) Avail: NTIS HC A04/MF A01 CSCL 08/11

This report concludes our study of large-scale vectorized numerical analysis applied to time domain seismic wave phenomena in filled basins. Applications include calculations of waves from simple surface or buried sources in a variety of idealized 2-D Basin and Range models (36,000 to 120,000 nodes) described in an interim report, and one large 3-D model (400,000 nodes) from Yucca Flat, Nevada Test Site, described here. Analysis is based on an explicit, finite element, elastic wave solver designed for vectorized execution on the CRAY-1. The primary result of the present 3-D study is that, given the database available from investigations in Yucca Flat, Nevada Test Site, the size of feasible 3-D computational models on the CRAY-1S is adequate to simulate elastic wave fields and interpret arrivals for comparison with existing 3-D ground motion data. Synthetic seismograms from a 400,000 element 3-D simulation of the COALORA event a Yucca Flat indicate that a significant source of transverse motion on radial lines through the source is diffraction from a discontinuity in the Rainier Mesa tuff layer across the Yucca fault. Successful time-domain simulations in 3-D are feasible with pipelined supercomputers but optimal processing requires careful tailoring of the algorithm to vectorize inner code loops and eliminate nonessential arithmetic. GRA

N84-34479*# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
INTRODUCTION TO SIMULATION OF UPPER ATMOSPHERE OXYGEN SATELLITE EXPOSED TO ATOMIC OXYGEN IN LOW EARTH ORBIT
Daniel R. Peplinski, Graham S. Arnold, and Eugene N. Borson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 133-145 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 04A

N84-34483*# Los Alamos Scientific Lab., N. Mex.
A LOW EARTH ORBIT MOLECULAR BEAM SPACE SIMULATION FACILITY
Jon B. Cross *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 193-204 refs (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 04A

N84-34520# Joint Publications Research Service, Arlington, Va.
METALLOGENIC STUDIES IN KAZAKHSTAN OUTLINED
A. Abdulin *In its* USSR Rept.: Mater. Sci. and Metallurgy, No. 94 (JPRS-85025) 28 Dec. 1983 p 21-23 Transl. into ENGLISH from Kazakhstanskaya Pravda (Alma-Ata), 6 Sep. 1983 p 2 (For primary document see N84-34512 24-23)
Avail: NTIS HC A04/MF A01

N84-34719# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. fuer Geodaesie und Photogrammetrie.
SPACE LASER APPLICATIONS IN GEOPHYSICS
H.-G. Kahle and F. Barlier (Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse, France) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34720# Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
EARTH'S ROTATION AND ITS GEOPHYSICAL IMPLICATIONS
F. Barlier and H. G. Kahle (Eidgenoessisches Technische Hochschule, Zurich) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 3 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34721# Centre National d'Etudes Spatiales, Paris (France).
SPACEBORNE LASERS IN ATMOSPHERIC RESEARCH
J. E. Blamont *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34743*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACEBORNE LIDAR INVESTIGATIONS OF THE ATMOSPHERE
E. V. Browell and S. Ismail (Systems and Applied Sciences Corp., Hampton, Va.) *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01 CSCL 04A

N84-34748# Kiel Univ. (West Germany). Inst. fuer Meereskunde.
DIFFERENTIAL ABSORPTION LIDAR IN SPACE FOR TEMPERATURE AND HUMIDITY PROFILES IN THE ATMOSPHERE
H. Grassl and P. Schluessel *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 6 p refs Sponsored by Battelle Institut (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-35043# Ministry of Communications, Taipei (Taiwan). Telecommunication Labs.
ON THE STUDY OF THE PREDICTION METHOD OF IONOSPHERIC F2-LAYER CRITICAL FREQUENCY Abstract Only
Yang-Shyang Ju *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 9-10 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35045# Ministry of Communications, Taipei (Taiwan).
SOME PRELIMINARY RESULTS OF IONOSPHERIC SLAB THICKNESS OBSERVATIONS AT LUNPING Abstract Only

Yinn-Nien Huang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 15 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35046# Ministry of Communications, Taipei (Taiwan).
A FURTHER STUDY ON THE SPATIAL CORRELATION OF THE TOTAL ELECTRON CONTENT AT PAIRS OF SUBIONOSPHERIC POINTS LOCATED AT THE CREST ZONE OF THE EQUATORIAL ANOMALY Abstract Only
Yinn-Nien Huang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 15-16 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35051# National Science Council, Taipei (Taiwan).
THE GEOLOGIC STUDY OF TAIWAN AREA FOLLOWING UP THE ACQUISITION OF TAIWAN SLAR IMAGERY Abstract Only
Jin-King Liu *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 61 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35052# National Central Univ., Chung-Li (Taiwan).
THE GEOLOGIC AND GEOPHYSICAL STUDY OF THE HENG-CHUNG PENINSULA, SOUTHERN TAIWAN, 1 Abstract Only
Tsang-Po Yen, Yu-Hua Tzou, and Kuo-Cherng Sung *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 62-63 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N84-34815*# Universities Space Research Association, Columbia, Md.
INITIALIZATION OF A MESOSCALE MODEL FOR APRIL 10, 1979, USING ALTERNATIVE DATA SOURCES
Michael W. Kalb Washington NASA Aug. 1984 245 p refs (Contract NAS8-34767)
(NASA-CR-3826; NAS 1.26:3826) Avail: NTIS HC A11/MF A01 CSCL 04B

A 35 km grid limited area mesoscale model was initialized with high density SESAME radiosonde data and high density TIROS-N satellite temperature profiles for April 10, 1979. These data sources were used individually and with low level wind fields constructed from surface wind observations. The primary objective was to examine the use of satellite temperature data for initializing a mesoscale model by comparing the forecast results with similar experiments employing radiosonde data. The impact of observed low level winds on the model forecasts was also investigated with experiments varying the method of insertion. All forecasts were compared with each other and with mesoscale observations for precipitation, mass and wind structure. Several forecasts produced convective precipitation systems with characteristics satisfying criteria for a mesoscale convective complex. High density satellite temperature data and balanced winds can be used in a mesoscale model to produce forecasts which verify favorably with observations. B.G.

N84-34816# Meteorological Satellite Center, Tokyo (Japan).
METEOROLOGICAL SATELLITE CENTER TECHNICAL NOTE NO. 9, 1984
Mar. 1984 77 p refs In JAPANESE and ENGLISH
(ISSN-0388-9653) Avail: NTIS HC A05/MF A01

Observations of the Karman vortex sheet by Japan's Himawari satellite, cloud imagery obtained by satellite, and VISSR IR grid processing are discussed. Procedures are given for estimating cloud wind and tropical cyclone intensity. For individual titles, see N84-34817 through N84-34822.

N84-34817# Meteorological Satellite Center, Tokyo (Japan).
THE KARMAN VORTEX STREET DETECTED BY THE GEOSTATIONARY METEOROLOGICAL SATELLITE HIMAWARI
Akira Moriwaki *In its* Meteorol. Satellite Center Tech. Note No. 9, 1984 Mar. 1984 p 1-9 refs In JAPANESE; ENGLISH summary (For primary document see N84-34816 24-47)
Avail: NTIS HC A05/MF A01

Karman vortex streets detected by the Geostationary Meteorological Satellite Himawari were observed in a down-side area of an island. In these areas common conditions are found geographically and meteorologically. Three numbers were defined: Reynolds number, Strouhal number, and a ratio b/a (b: a distance between two vortex streets, a: a distance between neighboring vortices living up along a street). These numbers are discussed, and the ratio b/a was measured using data obtained near Japan. According to a statistical investigation, there was a frequent occurrence, in the down-side of Che-ju island from December to January, and in that of Yaku-shima island on February, respectively. The case of December 23rd to 24th, 1981 has been analyzed. Results showed that a shape of vortex streets represented trajectories of air particles in the vicinity of the island. Author

N84-34818# Meteorological Satellite Center, Tokyo (Japan).
CLOUDS WITH APPEARANCE LIKE Cb-CLOUD ON SATELLITE IMAGERY
Tahaaki Kimura *In its* Meteorol. Satellite Center Tech. Note No. 9, 1984 Mar. 1984 p 11-23 refs In JAPANESE; ENGLISH summary (For primary document see N84-34816 24-47)
Avail: NTIS HC A05/MF A01

It is often difficult to distinguish cumulonimbus (Cb) from cirrus (Ci) in satellite cloud imagery when only IR imagery is available. In some cases it is not easy even if both VIS and IR imagery are used. Several examples of such difficult cases observed by the Japanese geostationary meteorological satellite are given. How to discriminate between Cb- and Ci-cloud with the aid of weather radar observation and upper air analysis is discussed. Author

N84-34819# Meteorological Satellite Center, Tokyo (Japan).
A NEW PROCEDURE OF OBJECTIVE TARGET CLOUD SELECTION FOR THE GMS CLOUD WIND ESTIMATION SYSTEM AND THE ACCURACY OF THE RESULTANT WIND VECTORS
Tadaaki Hamada and Kazuyasu Kato (Japan Meteorological Agency) *In its* Meteorol. Satellite Center Tech. Note No. 9, 1984 Mar. 1984 p 27-38 refs In JAPANESE; ENGLISH summary (For primary document see N84-34816 24-47)
Avail: NTIS HC A05/MF A01

The AS projective target cloud selection procedure was developed for the Japanese cloud wind estimation system (CWES) in order to: (1) eliminate the variation of the quality and quantity of resultant winds caused by the degree of skillfulness of the operator; (2) minimize computer processing time used during the processing of target cloud selection; and (3) increase the horizontal density of satellite winds. Suitable clouds to be tracked were selected automatically on the basis of a histogram analysis of infrared brightness temperature. The test operation of CWES system using the AS procedure was carried out for about two months. The resultant winds from the test operation were compared with those from the man-machine interactive procedure (MM procedure) and with conventional radiosonde winds during the same period. It was demonstrated that winds from both AS and MM procedures are similar in quality; the AS winds deviated from radiosonde winds at 850 mb as much as the MM winds; the horizontal distribution of the winds from the AS procedure was more even than that from the MM procedure; and the processing time of the AS procedure was one tenth of that of the MM procedure. On the basis of these results, the Meteorological Satellite Center adopted the AS procedure in place of the MM procedure. Author

N84-34820# Meteorological Satellite Center, Tokyo (Japan).
AN EXPLANATION OF THE REVISED DVORAK TECHNIQUE FOR ESTIMATING TROPICAL CYCLONE INTENSITY USING SATELLITE CLOUD IMAGERY AND SOME RESULTS OF ITS

APPLICATION TO TWO 1982 STORMS

Hiroyuki Koba *In its* Meteorol. Satellite Center Tech. Note No. 9, 1984 Mar. 1984 p 39-56 refs In JAPANESE; ENGLISH summary (For primary document see N84-34816 24-47)
Avail: NTIS HC A05/MF A01

The Dvorak technique for estimating tropical cyclone current intensity (CI) which was modified to include enhanced infrared imagery is explained for use in operational satellite tropical cyclone cloud imagery analysis at Japan's Meteorological Satellite Center. The revised technique was applied to the entire life of two typhoons, 8210 and 8213, and its performance was assessed. The estimated storm intensity (CI number) agreed well with that from JMA official analysis in 36% of total 74 cases in EIR imagery analysis and the difference between them fell within 0.5 number in 90% of whole cases. The range of CI number was 2.0 to approximately 7.0. The previous Dvorak technique showed better agreement between CI number and official minimum central pressure during the storm's development stage (CI number 5.0 to approximately 7.0). The eye adjustment procedure gave lower estimation of CI number by 0.5. Independent application of the eye features or vertical depth of cloud features adjustment procedure yielded better results. During the storm development stage, the deepest central pressure was analyzed 6 to 12 hours after the most developed cloud pattern was observed. Author

N84-34821# Meteorological Satellite Center, Tokyo (Japan).

VISSR IR GRID DATA PROCESSING

Norihiko Maeda and Taichi Takahashi *In its* Meteorol. Satellite Center Tech. Note No. 9, 1984 Mar. 1984 p 57-60 In JAPANESE (For primary document see N84-34816 24-47)
Avail: NTIS HC A05/MF A01

Such meteorological data as wind vector, sea surface temperature, and cloud distribution have been collected by VISSR and processed by computer at Meteorological Satellite Center. The processed data are then sent out to be utilized. MSC/Japan Meteorological Agency is now attempting to develop a method to compress the data, which can be sent out in their original form to the outside stations to be processed and analyzed. One possibility is VISSR IR Grid Data processing. VISSR data described here are utilized for the projection of vapor level and for bad weather warnings for flights. VISSR IR Grid data processing flow charts show the following: GMSSA File & Sea surface file-Temperature measurement of five cloud heights-Data file on five cloud altitudes-Grid data collection-Grid data file-Ades code--preparation and processing-Grid ades file-On batch file to be sent out for processing. The grid of 100x100 covers every one degree of latitude and longitude from 90 deg east to 170 deg west latitudes and from 50 deg north and 50 deg south longitudes. Five altitudes of cloud are MC(400)(below 400 mb), MC(500), MC(600), MC(700) and MC(above 700 mb). Transl. by B.G.

N84-34822# Meteorological Satellite Center, Tokyo (Japan).

INTRODUCTION TO THE INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT (ISCCP)

Shunichiro Kadowaki *In its* Meteorol. Satellite Center Tech. Note No. 9, 1984 Mar. 1984 p 61-70 refs In JAPANESE (For primary document see N84-34816 24-47)
Avail: NTIS HC A05/MF A01

The International Satellite Cloud Climatology Project (ISCCP) was launched on July 1, 1983 at several locations in the world including the Meteorological Satellite Center/Japan Meteorological Agency. ISCCP's objective is to compile 5-year statistical data covering clouds of the entire Earth derived from meteorological satellites for cloud climatology. The particular task performed by the Japanese at the moment is to process the meteorological data obtained every three hours by GMS Himawari II at 140 E with VIS 0.55-0.75 micrometer and IR 10.5-12.5 micrometer. Table 1 lists details of ISCCP; Table 2, main features of operational satellite participating in the project; Table 3, Earth surface and atmospheric properties considered in ISCCP. Data processing stages are roughly divided into A, B, and C. A represents preprocessing stage with scan line numbers and pixel numbers; B, global, standardized, adjusted, processed radiance data; C, cloud climatology data. Transl. by B.G.

N84-34823# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

TRANSIENT CONVECTION OVER THE AMAZON/BOLIVIA REGION AND THE DYNAMICS OF DROUGHT OVER NORTH-EAST BRAZIL

Julio Buchmann (Federal Univ. of Rio de Janeiro), Pedro Leite daSilvaDias (Inst. Astronomico e Geofisico da USP), and Antonio Divino Moura Aug. 1984 6 p refs Presented at the WMO Symp. on Meteorol. Aspects of Tropical Droughts, Fortaleza, Brazil, 24-28 Sep. 1984
(INPE-3226-PRE/577) Avail: NTIS HC A02/MF A01

A two layer, nonlinear, equatorial beta plane model, in p coordinates is used to study the atmospheric response to a large scale prescribed heat source varying in time. The heat source is meant to represent a convective burst with total duration of approximately 48 hours over the Amazon/Bolivia region. The boundary conditions used are meridional velocity zero at 60 deg N and 60 deg S, omega=0 at the top and zero geometric velocity at the lower boundary. Sensitivity study was done which include initial state at rest compared with realistic initial flow. The scale of the heat source is 1500 kilometers in latitude and longitude and it is centered at 10 deg S. Special attention is paid to the distribution and intensity of the induced vertical motion. The model is integrated for two days and the preliminary results show agreement with the observed 200 millibars flow. Of interest is the establishmemt of a trough and descending motion to the northeast of the heat source. A conjuncture is thus made that the Amazon heat source and its fluctuations bear some relationship with the drought problem over Northeast Brazil. Author

N84-34824# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A SYNOPTIC STUDY OF THE INFLUENCE OF EXTRA-TROPICAL LATITUDE SYSTEMS ON THE CLIMATIC VARIABILITY IN NORTHEAST BRAZIL

Julio Buchmann (Federal Univ. of Rio de Janeiro), Antonio Divino Moura, and Miguel Hiroo Hirata Aug. 1984 7 p refs Presented at the WMO Symp. on Meteorol. Aspects of Tropical Droughts, Fortaleza, Brazil, 24-28 Sep. 1984
(INPE-3225-PRE/576) Avail: NTIS HC A02/MF A01

Using ten years of data at 700, 500 and 200 millibars levels, in the region between 48 deg N, 48 deg S, 20 W - 70 W, a diagnostic study was performed in order to understand the mechanisms of lateral (latitudinal) forcings due to extra-tropical synoptic systems which are associated with rainfall anomalies (droughts and floods) over Northeast Brazil. It is found that at 700 millibars the northeast flow towards Northeast Brazil is weaker (stronger) during a relatively dry (wet) year, in agreement with the works of Namias (1972) and Hastenrath and Heller (1977). The deviations of latitudinal fluxes of momentum and potential energy indicate that the latitudinal exchange of these quantities is mainly in the region of 20 deg W to 50 deg W, during the very wet years over Northeast Brazil. With these results, the critical latitude was determined. Author

N84-34825# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A STUDY OF THE INFLUENCE OF EXTRA-TROPICAL LATITUDE SYSTEMS ON THE CLIMATIC VARIABILITY IN NORTHEAST BRAZIL

Julio Buchmann (Federal Univ. of Rio de Janeiro, Brazil), Antonio Divino Moura, and Miguel Hiroo Hirata (Federal Univ. of Rio de Janeiro, Brazil) Sep. 1984 33 p refs Submitted for publication (INPE-3264-PRE/595) Avail: NTIS HC A03/MF A01

The relationship between Northeast Brazil interannual precipitation variability (droughts and flooding events) and the global changes in atmospheric circulation was studied. Ten years of monthly mean upper air data for the region 48N-48S, 20W-90W were analyzed. At 700 mb, results show an increase of eddy momentum flux in the tropical North Atlantic for a wet year and a

decrease for a dry year. The eddy potential energy flux shows a reversal of slope in the tropical region (about 20S to 10N) for these two years. Most of the contribution comes from the longitude band of 20W-50W, which includes Northeast Brazil. The 200 mb flow is westerly in most of the cases in the North Atlantic sector up to 5N or even to the equator. This condition favors the coupling between the Northeast Brazil region and the extra-tropics, by allowing the propagation of mid-latitude perturbations into the tropics. On the other hand at 700 mb the flow is easterly in most of the tropical North Atlantic, thus raising the importance of baroclinicity in this problem. A simple, nonlinear, two layer model is used with realistic forcing in the northern boundary (35N) to compare the model results for two extreme cases of drought (year 1972) and flood (year 1974) and to verify conditions for equatorward propagation when baroclinicity is present. Author

N84-34826# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ARE DROUGHTS PREDICTABLE?
R. P. Kane and N. B. Trivedi Sep. 1984 19 p refs Submitted for publication
(INPE-3274-PRE/598) Avail: NTIS HC A02/MF A01

From a study of rainfall series at several locations, it is shown that approximate but meaningful predictions of dry spells are possible for regions where the rainfall series have prominent periodicities (of large amplitudes) in the long periodicity region (about 10 years or more). Limitations of the predictions are discussed. Author

N84-34827*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASA CLIMATE DATA CATALOG
Mary G. Reph Aug. 1984 113 p refs
(NASA-TM-86085; NAS 1.15:86085) Avail: NTIS HC A06/MF A01 CSCL 04B

This document provides a summary of information available in the NASA Climate Data Catalog. The catalog provides scientific users with technical information about selected climate parameter data sets and the associated sensor measurements from which they are derived. It is an integral part of the Pilot Climate Data System (PCDS), an interactive, scientific management system for locating, obtaining, manipulating, and displaying climate research data. The catalog is maintained in a machine readable representation which can easily be accessed via the PCDS. The purposes, format and content of the catalog are discussed. Summarized information is provided about each of the data sets currently described in the catalog. Sample detailed descriptions are included for individual data sets or families of related data sets. M.A.C.

N84-34828*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GASP CLOUD- AND PARTICLE-ENCOUNTER STATISTICS AND THEIR APPLICATION TO LPC AIRCRAFT STUDIES. VOLUME 1: ANALYSIS AND CONCLUSIONS
William H. Jasperson (Control Data Corp., Minneapolis, Minn.), Gregory D. Nastrom (Control Data Corp., Minneapolis, Minn.), Richard E. Davis, and James D. Holdeman (NASA. Lewis Research Center) Oct. 1984 92 p refs
(NASA-TM-85835; L-15789; NAS 1.15:85835) Avail: NTIS HC A05/MF A01 CSCL 04B

Summary studies are presented for the entire cloud observation archieve from the NASA Global Atmospheric Sampling Program (GASP). Studies are also presented for GASP particle concentration data gathered concurrently with the cloud observations. Cloud encounters are shown on about 15 percent of the data samples overall, but the probability of cloud encounter is shown to vary significantly with altitude, latitude, and distance from the tropopause. Several meteorological circulation features are apparent in the latitudinal distribution of cloud cover, and the cloud encounter statistics are shown to be consistent with the classical mid-latitude cyclone model. Observations of clouds spaced more closely than 90 minutes are shown to be statistically dependent. The statistics for cloud and particle encounter are utilized to estimate the frequency of cloud encounter on long range airline routes, and to assess the probability and extent of laminar flow loss due to cloud or particle encounter by aircraft utilizing laminar flow control (LFC). It is shown that the probability of extended cloud encounter is too low, of itself, to make LFC impractical. Author

N84-34829*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NASA/MSFC FY-84 ATMOSPHERIC PROCESSES RESEARCH REVIEW
William W. Vaughan, comp. and Fay Porter, comp. Washington Sep. 1984 223 p refs Rev. held in Huntsville, Ala., 30 Apr. and 2-3 May 1984
(NASA-CP-2329; M-458; NAS 1.55:2329) Avail: NTIS HC A10/MF A01 CSCL 04B

The two main areas of focus for NASA/MSFC's atmospheric research program are: (1) global scale processes (geophysical fluid processes, satellite Doppler lidar wind profiler, and satellite data analyses) and (2) mesoscale processes (atmospheric electricity (lightning), ground/airborne Doppler lidar wind measurements, and mesoscale analyses and space sensors). Topics within these two general areas are addressed. For individual titles, see N84-34830 through N84-34896.

N84-34830*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THEORETICAL ANALYSES OF BAROCLINIC FLOWS Abstract Only
Basil N. Antar and William W. Fowlis *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 9-10 Prepared in cooperation with Tennessee Univ. Space Inst., Tullahoma (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Completed and ongoing research activities are discussed briefly, including a three-dimensional, linear stability analysis of the baroclinic Hadley cell and a numerical model of the baroclinic flow between two rotating concentric spheres. This model simulates axisymmetric flow in the Atmospheric General Circulation Experiment configuration. A computer code designed to solve the strongly nonlinear stability problem for the Eady basic state is mentioned. R.S.F.

N84-34831*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THEORETICAL FLOW REGIME DIAGRAMS FOR THE AGCE Abstract Only
William W. Fowlis, Timothy L. Miller, Glyn O. Roberts (Roberts Associates, Inc., Vienna, Va.), and Kenneth J. Kopecky (Drake Univ.) *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 11-12 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The major criterion for the design of the Atmospheric General Circulation Experiment is that it be possible to realize strong baroclinic instability in the apparatus. A spherical annulus configuration which allows only steady basic state flows was chosen for the first set of stability analyses. Baroclinic instability was found for this configuration and few results suggest a regime diagram very different from the cylindrical annulus regime diagram. R.S.F.

N84-34832*# Colorado Univ., Boulder. Dept. of Astrophysical, Planetary and Atmospheric Sciences.
THEORETICAL AND EXPERIMENTAL STUDIES IN SUPPORT OF THE GEOPHYSICAL FLUID FLOW EXPERIMENT
John Hart, Juri Toomre, and Peter Gilman *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 13-15 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Computer programming was completed for digital acquisition of temperature and velocity data generated by the Geophysical Fluid Flow Cell (GFFC) during the upcoming Spacelab 3 mission. A set of scenarios was developed which covers basic electro-

hydrodynamic instability, highly supercritical convection with isothermal boundaries, convection with imposed thermal forcing, and some stably stratified runs to look at large-scale thermohaline ocean circulations. The extent to which the GFFC experimental results apply to more complicated circumstances within the Sun or giant planets was assessed. R.S.F.

N84-34833*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
GFFC EXPERIMENT PROGRESS
Fred Leslie *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 17-19 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Vibration, out-gas, and acoustic tests performed on the Geophysical Fluid Flow Cell (GFFC) instrument are reported. The slope of the 59 experiments to be performed by GFFC is outlined. Spacelab 3 crew training on the operation of the GFFC instrument is mentioned. R.S.F.

N84-34834*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NUMERICAL STUDIES OF BAROCLINIC INSTABILITY AT SMALL RICHARDSON NUMBER
T. L. Miller *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 21-22 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Baroclinic instability at small Richardson number consists of competition between symmetric (Solberg) modes, zonal (Eady) modes, and possibly other modes whose orientation is neither symmetric nor zonal. In FY-84, a study of the fully nonlinear development and energetics of the symmetric modes was completed. The nonlinear effects were quite strong and, in some senses, unexpected. Secondly, a study of the dependency of the energetics of the symmetric modes upon the physical parameters was completed. R.S.F.

N84-34835*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LABORATORY STUDIES OF BAROCLINIC INSTABILITY AT SMALL RICHARDSON NUMBER
Timothy L. Miller and William W. Fowlis *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 23-24 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

As part of the support program for the Atmospheric General Circulation Experiment, laboratory studies of baroclinic and other convective instabilities were performed for a thin layer of fluid between thermally conducting horizontal discs. There were three types of modes identified. The first has a spiral-arm appearance, and exists for large enough horizontal thermal forcing, weak enough static stability, and large enough rotation. The source of this wave is shown to be the Eady mode of instability. The second mode is due to convective instability in the thermal boundary layers which exist due to the thermally conducting horizontal boundaries. Finally, for strong enough negative static stability, thermal convection of the Benard type appears. The most significant result is that the symmetric (Solberg) mode was not found, even though the infinite-plane theory predicts this mode under certain experimental conditions. R.S.F.

N84-34836*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OVERVIEW OF GLOBAL SCALE RESEARCH DOPPLER LIDAR ACTIVITIES Abstract Only
D. E. Fitzjarrald *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 25-27 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Efforts in support of a global backscatter mission are reviewed briefly. Lidar system sensitivity was calibrated by means of ground-based tests. The analysis of ground-based data and planning of a global backscatter mission were conducted. Proposals for FY-85 include using a more powerful laser to conduct backscatter measurements. R.S.F.

N84-34837*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ATMOSPHERIC BACKSCATTER RESEARCH Abstract Only
David A. Bowdle *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 29 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Backscatter measurements were analyzed to evaluate the clean/dirty airmass hypothesis, the spatial scales of backscatter variability, and the correlation of backscatter and water vapor concentrations. R.S.F.

N84-34838*# Institute for Atmospheric Optics and Remote Sensing, Hampton, Va.
DEVELOPMENT OF A GLOBAL MODEL FOR ATMOSPHERIC BACKSCATTER AT CO2 WAVELENGTHS Abstract Only
G. S. Kent, P-H. Wang, U. Farrukh, and A. Deepak *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 31-32 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The effect of aerosol microphysical processes on the backscatter from an aerosol plume undergoing long-range atmospheric transport was studied. A numerical model which examines the effects of coagulation and sedimentation on an aerosol size distribution is under development and the initial results for a single homogeneous layer were obtained. Use was made of the SAGE/SAM II data set to study the global variation of aerosol concentration and, hence, to predict the variation of Beta sub CO2. Computer programs were written to determine the mean, median, and the probability distribution of the measured aerosol extinction as a function of altitude, latitude and geographical conditions. The first data sets analyzed in this way are under study. Data was used to study aerosol behavior over the U.S.A. and the Pacific Ocean. R.J.F.

N84-34839*# Alabama A & M Univ., Normal.
ATMOSPHERIC EFFECTS ON COHERENT LIDAR SYSTEMS Abstract Only
Rom Murty *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 33 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Atmospheric effects on lidar systems at 10.6 micron wavelength involving molecular absorption, aerosol scattering and refractive turbulence effects are discussed. Work on the combined effects of beam truncation and atmospheric refractive turbulence on the system performance are discussed, as well as the modeling of backscattering characteristics of atmospheric aerosols. R.J.F.

N84-34840*# Illinois State Water Survey, Champaign.
VARIATIONAL OBJECTIVE ANALYSES FOR CYCLONE STUDIES Abstract Only
Gary L. Achtemeier, Stanley Q. Kidder, and Harry T. Ochs *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 35-36 Prepared in cooperation with Illinois Univ., Urbana (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The basic analysis equations, i.e., the two horizontal momentum equations, the hydrostatic equation, and the integrated continuity equation were derived for the nonlinear vertical coordinate, nondimensionalized, and expressed in finite differences on a staggered grid. Special care was taken to transform the hydrostatic equation and the pressure gradient terms of the horizontal momentum equations to nearly eliminate truncation error over steeply sloping terrain. This formulation also eliminated explicit reference to orographically induced variations in the thermodynamic variables so that the variational adjustments are

on the scale of the meteorological perturbations. The analysis equations were subjected to the Euler-Lagrange operations as expressed for finite differences and an additional set of five partial differential equations was derived, bringing to nine the number of equations in Model I. Higher order terms, terms containing observed quantities, and terms containing none of the variables to be adjusted were grouped into forcing functions and the equations were solved for the zero order terms. Zero order variables were eliminated between these equations and there resulted two diagnostic equations which take the form of general linear second order partial differential equations with nonconstant coefficients.
R.J.F.

N84-34841*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THE APPLICATION OF SATELLITE DATA TO STUDY THE EFFECTS OF LATENT HEAT RELEASE ON CYCLONES
John H. E. Clark *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 37-40 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Generalized energetics were studied for nonlinear inviscid symmetric instability (SI). It was found that the linear theory fails to predict the stability in certain cases where the basic state is transitional between stability and instability. The initial growth of the SI perturbations can be fairly well approximated by linear theory, but the long time nonlinear evaluations will be bonded energetically if the SI region is finite. However, a further extension of the energetics to conditional symmetric instability (CSI) shows that the nonlinear evolution of circulation will energetically depend much more on the precipitation in a complicated way. By treating the latent heat as a source which is implicitly related to the motion field, the existence, uniqueness and stability of steady viscous (CSI) circulations are studied. Viscous CSI circulations are proved to be unique and asymptotically stable when the heat sources are weak and less sensitive to the motion perturbations. By considering the fact that moist updrafts are narrow and using eddy viscosity of 0(1,000 m squared/s) the stability criterion suggests that some frontal rainbands were probably dominated by the CSI mechanism even in their mature quasi-steady stage.
R.J.F.

N84-34842*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THE USE OF SATELLITE DATA IN UNDERSTANDING AND PREDICTING CONVECTIVE AND LARGE-SCALE DYNAMICAL PROCESSES
John A. Dutton, John H. E. Clark, and Hampton N. Shirer *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 41-45 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Mesoscale convective processes and how they affect and interact with mid-latitude cyclones were studied. The ageostrophic and associated vertical motion field was calculated using a highly accurate iterative method of solving the semigeostrophic omega equation. The tendencies for convective destabilization in the 850-750 mb layer due to differential geostrophic and ageostrophic advection and differential moist adiabatic ascent, were found. The spectral models of the index oscillation, one barotropic and the other baroclinic, were developed. Theoretical and observational studies of cloud streets were conducted. R.J.F.

N84-34843*# Universities Space Research Association, Huntsville, Ala.
DETERMINATION OF RAINFALL AND CONDENSATIONAL HEATING IN THE SOUTH PACIFIC CONVERGENCE ZONE DURING FGGE SOP-1
Franklin R. Robertson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 47-49 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The role of cloud related diabatic processes in maintaining the structure of the South Pacific Convergence Zone is discussed. The method chosen to evaluate the condensational heating is a diagnostic cumulus mass flux technique which uses GOES digital IR data to characterize the cloud population. This method requires as input an estimate of time/area mean rainfall rate over the area in question. Since direct observation of rainfall in the South Pacific is not feasible, a technique using GOES IR data is being developed to estimate rainfall amounts for a 2.5 degree grid at 12h intervals. R.J.F.

N84-34844*# Universities Space Research Association, Huntsville, Ala.
USE OF SATELLITE DATA IN A DIAGNOSTIC PARAMETERIZATION OF CONVECTIVE HEATING
Franklin R. Robertson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 51-62 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Heating estimates derived from a diagnostic technique using observed rainfall and GOES IR digital imagery were completed and evaluated for accuracy. A sensitivity analysis was done to examine assumptions regarding shape of the normalized mass flux profile, cloud precipitation efficiency, and existence of convective scale downdrafts. The results, which were derived using what are felt to be bounding limits of the assumptions, indicate that the heating estimates are reliable for use in diagnostic available potential energy (APE) budgets. Comparison to heating estimates derived as residuals in the thermodynamic equation show the level of maximum heating (near 300 mb) to be the same on a time averaged basis. Heating estimates were used to study the response of the large scale environment to the cumulus scale thermodynamic forcing. An analysis of the thermally forced component of vertical motion through the omega equation showed that a significant fraction of the total grid scale upward motion results from the heating provided by the condensation and vertical eddy heat transport in the convective cells. R.J.F.

N84-34845*# Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
OBSERVATIONAL AND THEORETICAL STUDIES OF THE EVOLVING STRUCTURE OF BAROCLINIC WAVES
Barry Saltzman, Anthony R. Hansen, Richard Nagle, and Chung-Muh Tang (Universities Space Research Association, Columbia, Md.) *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 55-57 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Dynamical processes involved in comma cloud formation, and passive tracer evolution in a baroclinic wave are discussed. An analytical solution was obtained demonstrating the complex nongeostrophic flow pattern involved in the redistribution of low level constituents in a finite amplitude baroclinic wave, and in the formation of the typical humidity and cloud distributions in such a wave. Observational and theoretical studies of blocking weather patterns in middle latitude flows were studied. The differences in the energy and enstrophy cascades in blocking and nonblocking situations were shown. It was established that pronounced upscale flow of both of these quantities, from intermediate to planetary scales, occurs during blocking episodes. The upscale flux of enstrophy, in particular, suggests that the persistence of blocking periods may be due to reduced dissipation of the large scale circulation and therefore entail some above normal predictability.
R.J.F.

N84-34846*# Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
UTILIZATION OF SATELLITE CLOUD INFORMATION TO DIAGNOSE THE ENERGY STATE AND TRANSFORMATIONS IN EXTRATROPICAL CYCLONES Abstract Only
Phillip J. Smith *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 59-60 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

A study of the contribution of latent heat release to the synoptic scale vertical motions in the Jan. 9-11, 1975 extratropical cyclone case study was completed. Results indicate that early cyclone development was dominated by dry dynamical forcing. However, as the cyclone matured, the influence of latent heating became more significant. This influence appeared to be of two types, (1) the direct impact of heating causing a lowering of surface pressures, and (2) an indirect role in which the heating altered thermal and vorticity gradients and lead to subsequent increases in dry dynamical forcing. The kinetic energy budget was completed and extended to include an available potential energy budget. Focusing on the eddy component of the budgets, results indicate that kinetic energy increased throughout the cyclone's development, with the increase being most pronounced after the onset of significant latent heat release. Latent heating played a strong role not only in generating available potential energy, but also in forcing baroclinic release of potential energy. B.W.

N84-34847*# Universities Space Research Association, Columbia, Md.

THE EFFECTS OF LATENT HEAT RELEASE ON THE WAVES WITH EKMAN PUMPING Abstract Only

Chung-Muh Tang *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 61-62 refs (For primary document see N84-34829 24-47)

Avail: NTIS HC A10/MF A01 CSCL 04B

The problem of the effects of the latent heat release on the waves with both upper and lower boundary frictional effects is investigated. The influence of the vertical shear of the basic wind in these models will be investigated. These investigations will shed some light on the method of solution to the problem of including the effect of Ekman pumping on the moist baroclinic waves in the model of Tang and Fichtl. Author

N84-34848*# City Coll. of the City Univ. of New York. Dept. of Mechanical Engineering.

GROUP-KINETIC SCALING AS A BASIS FOR MODELING LARGE SCALE TURBULENCE Abstract Only

C. M. Tchen *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 63-66 (For primary document see N84-34829 24-47)

Avail: NTIS HC A10/MF A01 CSCL 04B

It was found that new concepts and methods were needed to develop a statistical theory of turbulence. The group kinetic method was devised for the transformation of the dynamical system into a kinetic system as the basis for a statistical treatment of turbulence. Spectral structure is used as a basis for turbulence modeling. B.W.

N84-34849*# Texas A&M Univ., College Station. Dept. of Meteorology.

APPLICATION OF SATELLITE DATA TO TROPIC/SUBTROPIC MOISTURE COUPLING

Aylmer H. Thompson and James P. McGuirk *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 67-69 (For primary document see N84-34829 24-47)

Avail: NTIS HC A10/MF A01 CSCL 04B

The objective is to utilize various satellite products from a number of satellites together with data observed from platforms available during the FGGE Special Observing Periods to diagnose synoptic scale events in date void regions. The focus is on episodes of northeastward traveling cloud bands which move out of the ITCZ over the eastern North Pacific Ocean. These events are called moisture bursts. B.W.

N84-34850*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

DYNAMICS AND ENERGETICS OF THE SOUTH PACIFIC CONVERGENCE ZONE DURING FGGE SOP-1

Dayton G. Vincent and Franklin R. Robertson *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 71-73 Prepared in cooperation with Purdue Univ., Lafayette, Ind. (For primary document see N84-34829 24-47)

Avail: NTIS HC A10/MF A01 CSCL 04B

The major objectives are to: (1) diagnose the physical processes responsible for the maintenance of the South Pacific Convergence Zone (SPCZ); and (2) examine the role of the SPCZ in the large-scale circulation patterns of the Southern Hemisphere. B.W.

N84-34851*# Mississippi Univ., University.

SEVERE STORM ELECTRICITY

Roy T. Arnold and W. David Rust (National Severe Storms Lab., Norman, Okla.) *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 87-88 (For primary document see N84-34829 24-47)

Avail: NTIS HC A10/MF A01 CSCL 04B

Successful ground truth support of U-2 overflights was been accomplished. Data have been reduced for 4 June 1984 and some of the results have been integrated into some of MSFC's efforts. Staccato lightning (multiply branched, single stroke flash with no continuing current) is prevalent within the rainfree region around the main storm updraft and this is believed to be important, i.e., staccato flashes might be an important indicator of severe storm electrification. Results from data analysis from two stations appear to indicate that charge center heights can be estimated from a combination of intercept data with data from the fixed laboratory at NSSL. An excellent data base has been provided for determining the sight errors and efficiency of NSSL's LLP system. Cloud structures, observable in a low radar reflectivity region and on a scale smaller than is currently resolved by radar, which appear to be related to electrical activity are studied. B.W.

N84-34852*# Universities Space Research Association, Huntsville, Ala.

MAXWELL CURRENTS BENEATH THUNDERSTORMS

R. J. Blakeslee and E. P. Krider (Arizona Univ., Tucson) *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 89-90 (For primary document see N84-34829 24-47)

Avail: NTIS HC A10/MF A01 CSCL 04B

Analyses of single station measurements of the Maxwell current density (Jm) made under Florida thunderstorms during the summer of 1981 have been completed. The results of these analyses indicate that: (1) Jm is usually dominated by the displacement current component when the electric field is close to zero; (2) Jm is steady with time in the intervals between lightning flashes; (3) Jm is not altered significantly by lightning; and (4) the average value of Jm changes slowly and over time scales that are comparable to those required for storm development. Maps have also been derived of the surface Maxwell current density for a number of the Florida TRIP (76-78) storms using field mill data to estimate Jm from the displacement current density. Studies show that these maps provide a good indication of the location and relative intensity of the storm current generators, and area-integrations of the current contours provide estimates of the total storm currents. B.W.

N84-34853*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

NIGHTTIME OBSERVATIONS OF THUNDERSTORM ELECTRICAL ACTIVITY FROM A HIGH ALTITUDE AIRPLANE

Marx Brook, Bernard Vonnegut, Richard E. Orville, and O. H. Vaughan, Jr. *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 91-92 Prepared in cooperation with State Univ. of New York, Albany and New Mexico Inst. of Mining and Technology, Socorro (For primary document see N84-34829 24-47)

Avail: NTIS HC A10/MF A01 CSCL 04B

Nocturnal thunderstorms were observed from above and features of cloud structure and lightning which are not generally visible from the ground are discussed. Most, lightning activity seems to be associated with clouds with strong convective cauliflower tops. In both of the storms lightning channels were visible in the clear air above the cloud. It is shown that substances produced by thunderstorm electrical discharges can be introduced directly

into the stratosphere. The cause and nature of the discharges above the cloud are not clear. They may be produced by accumulations of space charge in the clear air above the cloud. The discharges may arise solely because of the intense electric fields produced by charges within the cloud. In the latter case the ions introduced by these discharges will increase the electrical conductivity of the air above the cloud and increase the conduction current that flows from the cloud to the electrosphere. More quantitative data at higher resolution may show significant spectral differences between cloud to ground and intracloud strokes. It is shown that electric field change data taken with an electric field change meter mounted in an airplane provide data on lightning discharges from above that are quite similar to those obtained from the ground in the past. The optical signals from dart leaders, from return strokes, and from continuing currents are recognizable, can be used to provide information on the fine structure of lightning, and can be used to distinguish between cloud to ground and intracloud flashes. E.A.K.

N84-34854*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LIGHTNING MAPPER DEVELOPMENT: STATUS AND REQUIREMENTS
Hugh J. Christian *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 93-94 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The feasibility for the detection and location of lightning on a continuous basis using a sensor in geostationary orbit was established. Measurements of the optical characteristics of lightning and the capabilities of solid state mosaic focal plane arrays, indicate that the question is how high a detection efficiency can be achieved. The lightning mapper development to strengthen the scientific justification for placing a lightning sensor in geostationary orbit is discussed. The U-2 and ground based lightning research, modeling, and theoretical studies are reported. E.A.K.

N84-34855*# Washington Univ., Seattle. Space Sciences Div.
SOLAR INFLUENCE ON TERRESTRIAL WEATHER AND GLOBAL LIGHTNING PATTERNS VIA COSMIC RAY MODULATIONS Abstract Only
John T. A. Ely *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 95 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

A series of cosmic ray neutron monitor data which were used in three analyses: (1) solar activity influence on ionization of the upper troposphere and tropopause; (2) solar activity influence on Canadian high stratus in winter; and (3) the S3-4 satellite study of IMF/GMF magnetic coupling effects are reported. The magnetic coupling model of solar activity influence on atmospheric processes were investigated. The magnetic coupling model is used to explain a number of seemingly diverse studies lightning incidence is emphasized. E.A.K.

N84-34856*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LIGHTNING OBSERVATIONS ABOVE AND BELOW CLOUDS Abstract Only
Steven J. Goodman *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 97-98 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The quantitative optical characteristics of cloud to ground (CG) and intracloud (IC) lightning above clouds were studied. A data base of a number of pulse paramaters such as energy, rise times, pulse widths and pulse intervals was complied and categorized for first return strokes, subsequent strokes, the intracloud part of CG flashes and IC flashes. It is found that: (1) single stroke CG's are more readily distinguishable from IC flashes than multiple stroke CG's; (2) there is no significant difference between the energy of first and subsequent return stroke pulses; and (3) the pulse rise times and pulse widths are time broadened. Lightning activity in a mesoscale convective weather system (MCS) was examined. The CG flash rates average almost 50 per minute for 7 hours. It is shown that lightning above storms embedded within the MCS IC lightning activity can be much greater than CG activity at certain times in the MCS lifecycle. E.A.K.

N84-34857*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STORM SEVERITY DETECTION (RF) Abstract Only
R. L. Johnson, G. A. Smith, and S. J. Goodman *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 99-100 Prepared in cooperation with Southwest Research Inst., San Antonio, Tex. (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Measurement of lightning location data which occur together with continental thunderstorms and hurricanes was examined, and a second phase linear interferometer was deployed. Electrical emission originating from tropical storms in the Gulf of Mexico were monitored. The time span between hurricane ALLEN (10 August 1980) and hurricane ALICIA (18 August 1983) represents the longest period that the United States has gone without hurricane landfall. Both systems were active and data were acquired during the landfall period of hurricane ALICIA. E.A.K.

N84-34858*# Arizona Univ., Tucson. Inst. of Atmospheric Physics.
THE OPTICAL CHARACTERISTICS OF LIGHTNING
E. Philip Krider *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 101-102 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Optical signals radiated by Florida lightning were recorded in correlation with wideband electric field signatures. The amplitudes and time behavior of the early portion of the signals produced by return strokes indicate that this lightning process produces a space and time averaged peak radiance. E.A.K.

N84-34859*# State Univ. of New York, Albany. Dept. of Atmospheric Sciences.
REMOTE OBSERVATIONS OF SEVERE STORMS
Richard E. Orville *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 103-104 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

A lightning detection system which has been operating along the East Coast since August 1982 is outlined. The system will prove to be one source of ground truth for lightning flashes detected from above clouds. The first absolute spectral irradiance measurements over a wide wavelength range were reported. The observations of lightning from a U2 aircraft are reviewed. E.A.K.

N84-34860*# National Severe Storms Lab., Norman, Okla.
SEVERE STORM ELECTRICITY
W. David Rust, Donald R. MacGorman, William Taylor, and Roy T. Arnold (Mississippi Univ., University) *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 105-107 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Severe storms and lightning were measured with a NASA U2 and ground based facilities, both fixed base and mobile. Aspects of this program are reported. The following results are presented: (1) ground truth measurements of lightning for comparison with those obtained by the U2. These measurements include flash type identification, electric field changes, optical waveforms, and ground strike location; (2) simultaneous extremely low frequency (ELF) waveforms for cloud to ground (CG) flashes; (3) the CG strike location system (LLP) using a combination of mobile laboratory and television video data are assessed; (4) continued development of analog-to-digital conversion techniques for processing lightning data from the U2, mobile laboratory, and NSSL sensors; (5) completion of an all azimuth TV system for CG ground truth; (6) a preliminary analysis of both IC and CG lightning in a

mesocyclone; and (7) the finding of a bimodal peak in altitude lightning activity in some storms in the Great Plains and on the east coast. In the forms on the Great Plains, there was a distinct class of flash what forms the upper mode of the distribution. These flashes are smaller horizontal extent, but occur more frequently than flashes in the lower mode of the distribution. E.A.K.

N84-34861*# Wisconsin Univ., Madison. Space Science and Engineering Center.
STUDIES OF LIGHTNING DATA IN CONJUNCTION WITH GEOSTATIONARY SATELLITE DATA Abstract Only
David Suchman and Brian Auvine *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 109 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The archiving of a more complete data base to perform lightning studies is outlined. This effort includes: (1) continued archiving of bureau of land management LLP, geostationary satellite, and NWS radar data; (2) expansion of the McIDAS real-time LLP access to other networks. Additional processing tools for display and analysis of lightning location data in conjunction with geostationary satellite data are developed which entails adapting existing McIDAS software to allow the production of statistical summaries and contouring of lightning characteristics over user defined areas or storms. The plotting of three dimensional displays of lightning statistics versus satellite and radar data, and the performance of an error analysis of lightning location data using overlapping regions of the BLM network are discussed. E.A.K.

N84-34862*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LIGHTNING OBSERVATIONS FROM THE SPACE SHUTTLE Abstract Only
Bernard Vonnegut, O. H. Vaughan, Jr., and Marx Brook *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 111 Prepared in cooperation with State Univ. of New York, Albany and New Mexico Inst. of Mining and Technology, Socorro (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Motion pictures were taken at night from the space shuttle that show lightning discharges spreading horizontally at speeds of .00001 m/sec for distances over 60 km. Tape recordings were made of the accompanying optical pulses detected with a photocell optical system. The observations show that lightning is often a mesoscale phenomenon that conveys large amounts of electric charge and energy derived from an extensive cloud system into a cloud-to-ground discharge. Several video tape recordings of lightning discharges were obtained on shuttle flights since the termination of the NOSL program. The size and location of the lightning illuminated cloud images is now being analyzed, and comparisons are made with meteorological data concerning the cloud system obtained from the McIDAS. Author

N84-34863*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OVERVIEW OF MESOCALE RESEARCH DOPPLER LIDAR ACTIVITIES
D. E. Fitzjarrald *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 113-120 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

In evaluating the performance of the airborne Doppler lidar system, a large number of deficiencies or mistakes were identified in the original system and experiment plans. All of the known problems were addressed and corrected in the planning and engineering for the fall 1984/spring 1985 ADLS flight series. Thus, the most significant result of the data analysis was the input it has provided to the preparations for the new experiment. Attitude measurements are taken together with the streamlined operating procedures, color graphics real time displays of data, and better experiment design, the result is a second-generation system that is considerably better than the one used in 1981. B.G.

N84-34864*# Oklahoma Univ., Norman. School of Meteorology.
ANALYSIS OF LIDAR, RADAR AND SATELLITE MEASUREMENTS ON SEVERE THUNDERSTORMS AND THEIR ENVIRONMENTS
Howard Bluestein, Richard J. Doviak (National Severe Storms Lab., Norman, Okla.), Susan Zrnic (National Severe Storms Lab., Norman, Okla.), Robert Rabin (National Severe Storms Lab., Norman, Okla.), and A. Sundara-Rajan *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 121-123 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Intercomparison of wind data from the airborne Doppler lidar, ground-based Doppler radars, the 444 m NSSL-KTVY tower, and rawinsonde were completed. The vertical profile of wind in the PBL measured by the radars compared favorably with the profiles measured by the tower and rawinsonde while the one obtained from lidar data differed from the other three by as much as 3m/sec in wind speed and 38 degrees in direction. The time dependence of differences in wind estimates from radar and lidar suggested that these discrepencies could be attributed to a Schuler resonance in the aircraft's inertial navigation system which caused an erroneous component of the aircraft's velocity vector to be subtracted from the lidar radial velocities, thus creating errors in the synthesized wind speed and direction. The vertical profile of turbulent fluctuations of the horizontal wind detected by the different systems compared well. Also, spectra from the different sensing systems compared well in both magnitude and shape, suggesting that the lidar and radar detected similar turbulent structure. Author

N84-34865*# California Univ., Davis. Dept. of Land, Air and Water Resources.
EVALUATION OF AIRBORNE LIDAR WIND MEASUREMENTS Research Summary Report
John J. Carroll *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 125-127 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The verification of the Doppler lidar wind measurement is continued. The in situ measurements on a 500 meter tall tower are used to check the lidar determined winds (flight 4), followed by other tests applied to the extensive data sets of flights 19 and 21. After checking for possible software errors in the processing programs, the inconsistency was not solved. The source of the errors appears to be the uncertainty in the calculation of the contribution of the aircraft motion to the lidar measured line of sight speed. Possible techniques for estimating the aircraft motion errors from the aircraft data are investigated. B.G.

N84-34866*# Battelle Pacific Northwest Labs., Richland, Wash.
DOPPLER LIDAR RESULTS FROM THE SAN GORGONIO PASS EXPERIMENTS
William C. Cliff, J. Raymond Skarda, and David S. Renne *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 129-131 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

During FY-84, the Doppler Lidar data from the San Gorgonio Pass experiments were analyzed, evaluated, and interpreted with regard to signal strength, signal width, magnitude and direction of velocity component and a goodness parameter associated with the expected noise level of the signal. From these parameters, a screening criteria was developed to eliminate questionable data. For the most part analysis supports the validity of Doppler Lidar data obtained at San Gorgonio Pass with respect to the mean velocity magnitude and direction. The question as to whether the Doppler width could be interpreted as a measure of the variance of the turbulence within the Doppler Lidar System (DLS) focal volume was not resolved. The stochastic nature of the Doppler

broadening from finite residence time of the particles in the beam as well as other Doppler broadening phenomenon tend to mask the Doppler spread associated with small scale turbulence. Future tests with longer pulses may assist in better understanding. Author

N84-34867*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANALYSIS OF MSFC GROUND-BASED DOPPLER LIDAR DATA
Jeffry Rothermel *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 133-135 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Analysis of data collected during the participation of the MSFC 10.6 micron pulsed Doppler lidar system (DLS) in the Joint Airport Weather Studies (JAWS) experiment is concluded. Observations from more than one Doppler lidar are combined to derive the three-dimensional Cartesian wind field. A comparison of radial velocity estimates at low elevations made by the MSFC lidar and the NCAR 5.5 cm Doppler radar revealed a substantial r.m.s. difference of 3 m/s, and a mean difference of 1m/s. Detailed measurements of the horizontal wind fields and tropospheric backscattering were acquired at MSFC. These data are useful for defining future flight experiments, instrument design, and satellite DLS development. B.C.

N84-34868*# Chicago Univ., Ill. Dept. of the Geophysical Sciences.
ANALYSIS OF DOPPLER LIDAR WIND MEASUREMENTS
Ramesh C. Srivastava *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 137-142 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

New analysis methods were developed and refined for the synthesis of wind fields from multiple Doppler radar data. Considerable software was written and debugged for wind field synthesis. The analysis methods were applied to radar data collected during the CCOPE experiment in which lidar wind measurements were also made. The analysis method differs from existing methods in that interpolation (using filters with assigned weights) and advection of data, to account for time differential between data acquisition at different points, are not used. Instead, functional fits were used in space and time coordinates to transfer radial velocity data to a space-time grid. Subsequently the wind synthesis is performed. This method gives better space resolution in the synthesized winds, compared to other methods in common use, by better preserving the gradients of velocities. The wind fields show the cellular structure characteristic of boundary-layer convection. Also evident in the analysis are the sharp transitions and gradients in the wind field which were preserved by the synthesis. Author

N84-34869*# Wisconsin Univ., Madison.
REGIONAL SCALE SIMULATION OF ATMOSPHERIC STRUCTURE USING VAS DATA Abstract Only
George Disk, John LeMarshall, and David D. Houghton *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 151-152 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Investigations with both Subsynoptic Scale Model (SSM) and Limited Area Mesoscale Prediction System (LAMPS) are directed at model static initializations using Visible Infrared Spin Scan Radiometer Atmospheric Sounder (VAS) derived temperatures and moistures and also satellite derived winds. The general approach for each day's case study is similar. A 12-hour control forecast (no satellite data) is made 12Z-0Z, using a radiosonde analysis at 12Z as the initial field. For the satellite data experiments, reanalyses are performed at intermediate times, using VAS soundings or VAS soundings in combination with satellite winds. Forecasts are subsequently made from the reanalysis time(s) to the same validation hour (0Z) as the control forecasts. Comparisons are then made between the control forecast and satellite experiments. Author

N84-34870*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.
STATISTICAL ANALYSIS AND USE OF THE VAS RADIANCE DATA
Henry E. Fuelberg *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 153-155 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Special radiosonde soundings at 75 km spacings and 3 hour intervals provided an opportunity to learn more about mesoscale data and storm-environment interactions. Relatively small areas of intense convection produce major changes in surrounding fields of thermodynamic, kinematic, and energy variables. The Red River Valley tornado outbreak was studied. Satellite imagery and surface data were used to specify cloud information needed in the radiative heating/cooling calculations. A feasibility study for computing boundary layer winds from satellite-derived thermal data was completed. Winds obtained from TIROS-N retrievals compared very favorably with corresponding values from concurrent rawisonde thermal data, and both sets of thermally-derived winds showed good agreements with observed values. B.G.

N84-34871*# Atsuko Computing International, Huntsville, Ala.
MESOSCALE AND SEVERE STORMS (MASS) DATA MANAGEMENT AND ANALYSIS SYSTEM
John S. Hickey, Shogo Karitani, and Mike Dickerson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 157-159 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Progress on the Mesoscale and Severe Storms (MASS) data management and analysis system is described. An interactive atmospheric data base management software package to convert four types of data (Sounding, Single Level, Grid, Image) into standard random access formats is implemented and integrated with the MASS AVE80 Series general purpose plotting and graphics display data analysis software package. An interactive analysis and display graphics software package (AVE80) to analyze large volumes of conventional and satellite derived meteorological data is enhanced to provide imaging/color graphics display utilizing color video hardware integrated into the MASS computer system. Local and remote smart-terminal capability is provided by installing APPLE III computer systems within individual scientist offices and integrated with the MASS system, thus providing color video display, graphics, and characters display of the four data types. M.A.C.

N84-34872*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SEVERE STORM INITIATION AND DEVELOPMENT FROM SATELLITE INFRARED IMAGERY AND RAWINDSONDE DATA
R. J. Hung (Alabama Univ., Huntsville), R. E. Smith, and G. S. West *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 161-163 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The geographical distribution of potential temperatures, mixing ratio, and streamlines of flow patterns at 850, 700, and 500 mb heights are used to understand the prestorm convection and the horizontal convergence of moisture. From the analysis of 21 tornadoes the following conclusions are reached: (1) Strong horizontal convergence of moisture appeared at the 850, 700, and 500 mb levels in the area 12 hours before the storm formation; (2) An abundantly moist atmosphere below 3 km (700 mb) becomes convectively unstable during the time period between 12 and 24 hours before the initiation of the severe storms; (3) Strong winds veering with height with direction parallel to the movement of a dryline, surface fronts, etc; (4) During a 36-hour period, a tropopause height in the areas of interest is lowest at the time of tornadic cloud formation; (5) A train of gravity waves is detected before and during the cloud formation period. Rapid-scan infrared imagery provides near real-time information on the life cycle of the storm which can be summarized as follows: (1) Enhanced convection produced an overshooting cloud top penetrating above

the tropopause, making the mass density of the overshooting cloud much greater than the mass density of the surrounding air; (2) The overshooting cloud top collapsed at the end of the mature stage of the cloud development; (3) The tornado touchdown followed the collapse of the overshooting cloud top. M.A.C.

N84-34873*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MESOSCALE ANALYSIS OF VAS 6.7 MICRON IMAGE DATA FOR SEVERAL CASE STUDIES Abstract Only
Gary J. Jedlovec *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 165-166 ref (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Several case studies are examined in an attempt to relate Visible infrared spin scan radiometers Atmospheric Sounder (VAS) water vapor channel radiance data to atmospheric moisture. Since the 6.7 micrometer channel detects radiation emitted by atmospheric water vapor from a rather thick layer, a scheme is developed which weighted rawinsonde observations of relative humidity in a similar manner. A comparison of the two fields (weighted relative humidity values from gridded rawinsonde observations and the VAS water vapor image) indicates that even when mesoscale data are used, the technique only presented a smooth representation of the radiance field. This weighting function is dependent on both the temperature and moisture distribution of the atmosphere. Cross sections of relative humidity from the mesoscale rawinsondes are produced which sliced the water vapor imagery in particularly interesting regions (areas of high and low blackbody temperatures). Comparisons are then made between the cross sections and the variations in the VAS radiance data along the cross section line. Bright regions in the water vapor imagery (cold blackbody temperatures) are often associated with thin layers of high relative humidity or thick layers of only moderately moist air. The reverse also applies, i.e., dark regions (warm blackbody temperatures) in the imagery corresponded well with very dry regions in the cross sections. M.A.C.

N84-34874*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN APPLICATION OF VISSR ATMOSPHERIC SOUNDER (VAS) DATA IN MESOSCALE ANALYSIS
Gary J. Jedlovec *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 167-170 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

A very simple and straight forward approach to produce mesoscale analyses of VAS data over a large area (which may contain cloudy regions) with good temporal and spatial consistency. Commonly used objective analysis schemes are very effective in producing gridded fields of meteorological parameters where data spacing is uniformly spread over the entire analysis region. The amount of detail contained in these fields can be controlled to produce consisted mesoscale analyses. M.A.C.

N84-34875*# Wisconsin Univ., Madison. Space Science and Engineering Center.
MESOSCALE AGEOSTROPHIC CIRCULATIONS ASSOCIATED WITH BAROCLINIC JET STREAKS
Donald R. Johnson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 171-173 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Studies of ageostrophic motion attending jet streaks and convection are examined. Various types of dynamical experiments are carried out with the hybrid isentropic-sigma coordinate model. The effects of vorticity and static stability distributions on the intensity of secondary circulations forced by inertial accelerations as well as the superposition of an amplifying baroclinic wave on the jet streak structure are investigated. M.A.C.

N84-34876*# Universities Space Research Association, Huntsville, Ala. Atmospheric Sciences Div.
NUMERICAL SIMULATION OF MESOSCALE PRECIPITATION Abstract Only
Michael W. Kalb *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 175-176 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The numerical simulation of mesoscale precipitation as well as the development of software and appropriate computer techniques are investigated. The development of a mesoscale model and the means to incorporate meteorological data into the model are examined. M.A.C.

N84-34877*# Washington Univ., Seattle. Dept. of Atmospheric Sciences.
STUDIES OF MIDALTITUDE CYCLONE STRUCTURE WITH SEASAT SCANNING MULTICHANNEL MICROWAVE RADIOMETER
Kristina B. Katsaros *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 177-179 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The data provided by the atmospheric water channels of SEASAT's Scanning Multichannel Microwave Radiometer (SMMR) is used to investigate mesoscale structure at various stages of the development of a midlatitude cyclone. Seasonal and graphic differences in the storms are also studied. M.A.C.

N84-34878*# Universities Space Research Association, Huntsville, Ala.
STATISTICAL SEVERE STORM NOWCASTING COMPARISON OF VAS AND RAWINSONDE SOUNDINGS Abstract Only
David L. Keller *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 181 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The statistical severe storm nowcasting technique using upper air soundings (VAS or radiosonde) is translated to the IBM McIDAS system. The severe storm information content of Visible infrared spin scan radiometer Atmospheric Sounder (VAS) and rawinsonde sounding data is compared. The contours of the likelihood of severe storms based only upon upper air VAS and rawinsonde data are shown, as well as the outlook based upon surface data, radar, operational computer models, and other data sources. M.A.C.

N84-34879*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CLOUD SCALE INFLUENCES ON MESOSCALE PRECIPITATION PATTERNS Abstract Only
Fred J. Kopp (South Dakota School of Mines and Technology), Harold D. Orville (South Dakota School of Mines and Technology), and G. D. Emmitt *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 183-184 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

A two dimensional time dependent finite difference grid cloud model is discussed. The model simulates atmospheric motions, potential temperature, water vapor, cloud liquid, cloud ice, rain and small hail. Lateral boundary conditions are open allowing flow in and out of the model domain. Various amounts of convergence were simulated to test the effects on cloud initiation and development. Soundings were run and results discussed. E.R.

N84-34880*# Lassen Research, Manton, Calif.
MORPHOLOGY AND DEVELOPMENT OF ORGANIZED CONVECTION IN THE BOUNDARY LAYER Abstract Only
R. W. Lee *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 185 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Vector windspeed measurements in a horizontal plane are derived from an airborne Doppler lidar. Error correction has improved so that those which remain do not affect local flow analysis. This allows measurements of wave structures in and

near the boundary layer. Deep boundary layer measurements show pronounced interacting wave structures. Wave structures were also observed to result from obstacle flow. E.R.

N84-34881*# Airborne Research Associates, Weston, Mass.
SEARCH FOR SOLAR SIGNALS IN GOES IMAGERY AND CLOUD CLIMATOLOGY ANALYSIS Abstract Only
Ralph J. Markson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 187-189 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The digitization and analysis of 16mm GOES IR imagery to identify spatial and temporal variation in clouds is discussed, along with a cloud climatology analysis. Recently added to the Interactive Graphics Package was a Computer Image Analysis System. This system allows many new imaging techniques. One of the possibilities is the analysis of overall light intensity variations in six 10 degree square boxes across the intertropical convergence zone. This technique is discussed, as is a preliminary analysis of unnormalized data. E.R.

N84-34882*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.
STATISTICAL STRUCTURE OF CONVECTIVE PERIODS DERIVED FROM SATELLITE GROUND BASED DATA
Paul J. Meyer and Henry E. Fuelberg *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 191-192 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The documentation of characteristics of Vertical Atmospheric Soundings (VAS) through the use of statistical structure and correlation functions is presented. A measure of random error is also provided. Rawinsonde data from various periods is analyzed. Structure and correlation functions are used to compare VAS retrievals obtained using a physical algorithm with those from a regression technique. Results from both procedures are evaluated against those from a mesoscale network of rawinsonde stations. The parameters documented include temperature, mixing ratio, geopotential height, thickness, and precipitable water. Calculation are performed at several layers in the lower and upper troposphere. E.R.

N84-34883*# Alabama Univ., Huntsville. Environmental and Research Center.
INVESTIGATION OF MESOSCALE PRE-CONVECTIVE FORCING MECHANISMS
Richard T. McNider *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 193-194 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The installation and testing of a numerical mesoscale boundary layer model is discussed. A data analysis is first made using the rawinsonde network which shows a strong baroclinic zone developing in the region where convection was initiated. The observed wind field shows an easterly component developing in opposition to the synoptic flow producing convergence. The numerical boundary layer model is used to diagnose the physical development of the thermal and flow fields. Two physical mechanisms are examined; topography and cloud shading. The results shows that while heated sloping topography alone does create a baroclinic zone and convergence values, cloud shading is a stronger mechanism for producing a thermal field representative of observed conditions E.R.

N84-34884*# Drexel Univ., Philadelphia, Pa. Dept. of Physics and Atmospheric Science.
LAMPS SOFTWARE Abstract Only
D. J. Perkey and C. W. Kreitzberg *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 195 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The dynamic prediction model along with its macro-processor capability and data flow system from the Drexel Limited-Area and Mesoscale Prediction System (LAMPS) were converted and recorded for the Perkin-Elmer 3220. The previous version of this model was written for Control Data Corporation 7600 and CRAY-1a computer environment which existed until recently at the National Center for Atmospheric Research. The purpose of this conversion was to prepare LAMPS for porting to computer environments other than that encountered at NCAR. The emphasis was shifted from programming tasks to model simulation and evaluation tests.
Author

N84-34885*# Colorado State Univ., Fort Collins. Cooperative Inst. for Research in the Atmosphere.
INVESTIGATION OF ARC CLOUD LINES
James F. W. Purdom and Peter C. Sinclair *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 197-199 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The natural mechanisms that lead to the development of deep convective storms through the integration of radio scan satellite data with research aircraft observations is discussed. The aircraft measurements are designed to provide detailed air motion and thermodynamic data near and in the arc cloud line region at the same time GOES rapid scan data is taken. Inspection of the data indicates: (1) Arc cloud lines are important in both the production of convergence and vorticity, and in the interaction with intense thunderstorms which may act to trigger tornado activity. (2) The lateral extent of the vertical motion field compared to the cloud scale indicates that the main driving force for the initial cloud development along the arc-line is controlled by the thunderstorm outflow(s) interacting with the convectively unstable air of the environment. (3) Arc cloud lines and their associated DSL region can pose extreme hazards to aircraft operations. (4) An arc cloud line's major threat to space shuttle operations lie in its ability to generate new thunderstorm activity along the shuttle glide path. E.R.

N84-34886*# Wisconsin Univ., Madison. Space Science and Engineering Center.
APPLICATIONS OF THE AVE-SESAME DATA SETS TO MESOSCALE STUDIES Abstract Only
V. E. Suomi, Fred Mosher, Carl Norton, Robert J. Krauss, David Suchman, and J. T. Young *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 201-202 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Data collected by the lightning data concentrator are available for research. The Mark 3 McIDAS capability provides greater flexibility for the Marshall user community and serves as a model of future UW McIDAS to remote computer links. Techniques were investigated for the display of dynamic 3-D data sets. To date the most promising display technology is a polarized two CRT perspective display which allows both dynamic 3-D images and graphics presentations with full color capability. Algorithms were for the preparation and display of conventional and satellite based weather data in 3-D. These include gridding, contouring, and streamlining processors which operate on both real time and case study data bases. An upper air trajectory model was implemented which creates a display of air parcel trajectories in perspective 3-D. A subsystem for the generation of 3-D solid surface display with shading and hidden surface display with shading and hidden surface removal was tested and its products are currently being evaluated. Motion parallax introduced by moving the point of observation during display is an important depth cue, which, when added to the perspective parallax creates a very realistic appearing display. A.R.H.

N84-34887*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SATELLITE PRECIPITATION AND CLOUD EXPERIMENT

(SPACE) Abstract Only
James E. Arnold and Gregory S. Wilson *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 203-204 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

An experiment plan was formulated to support an investigation of the precipitation processes associated with mesoscale systems and the interaction of rain producing cloud complexes with the meso and macro-scale environment. The field program necessary to accomplish the scientific goals is designed to incorporate satellite information (VIS and IR as well as VAS data), special radiosonde and surface observing capabilities, radar observations of storms development, special observations from aircraft and ground based lightning measurements. The observing network comprises rawinsonde stations located in northern Alabama and eastern Tennessee. A high density raingauge network and the MSFC lightning location network also cover the area. Coordination with NASA U2 and ER2 aircraft programs and with the operational requirements of the microburst severe thunderstorm program can assure the most efficient utilization of the observing resources.
A.R.H.

N84-34888*# Chicago Univ., Ill.
ANALYSIS OF SATELLITE DATA FOR SENSOR IMPROVEMENT (DETECTION OF SEVERE STORMS FROM SPACE) Abstract Only
T. Theodore Fujita *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 205-206 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Stereo photography of clouds over southeast Asia was obtained using NOAA-7 and the Japanese GMS. Due to the breakdown of GMS2, GMS1, which had been retired, is being used as the replacement satellite. The launch of GMS should permit the US-Japan stereo experiment to be reactivated. The Lear jet experiment based at Grand Island, Nebraska was successful and provided data on the Redwood Falls clouds & Grand Island thunderstorm; an anvil-top cirrus deck; a circular thunderstorm; and jumping cirrus. The IR temperature field of the thunderstorm which induced the Andrews AFB microburst was analyzed with 1 C accuracy. The microburst and severe thunderstorm project is being planned.
A.R.H.

N84-34889*# Texas A&M Univ., College Station. Dept. of Meteorology.
RADAR ANALYSES OF MESOSCALE METEOROLOGICAL PHENOMENA DURING THE AVE/VAS CORRELATION FIELD EXPERIMENT Abstract Only
George L. Huebner *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 207-208 (For primary document see N84-34829 24-47)
(Contract NAS8-34972)
Avail: NTIS HC A10/MF A01 CSCL 04B

Radar data were collected during the selected critical times of the field experiment and subsequently analyzed for specific items. The analyses of the radar data for the AVE/VAS experiment provided statistically significant values for each of the 10 Km by 10 Km grids within radar range. The resulting information for correlation with satellite data included the following derived items that were averaged for each grid area: (1) rainfall rate in mm/hr; (2) dBZ (reflectivity) values; (3) accumulated rainfall values per hour; (4) accumulated rainfall values for a 6-hour period; (5) vertically integrated liquid water content per square meter; and (6) vertical height of the radar axis at the midpoint of each grid. Additional products derived from radar data are being investigated. An example of one such product is the derivation of the errors in integrated rainfall with different sampling periods. This is of significance for correlation with satellite data in that normally a step-function type of rainfall rate is used to derive the total rainfall over a period.
A.R.H.

N84-34890*# National Severe Storms Forecast Center, Kansas City, Mo.
DEVELOPMENT OF THE CENTRALIZED STORM INFORMATION SYSTEM (CSIS) FOR USE IN SEVERE WEATHER PREDICTION Abstract Only
Frederick R. Mosher *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 209 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The centralized storm information system is now capable of ingesting and remapping radar scope presentations on a satellite projection. This can be color enhanced and superposed on other data types. Presentations from more than one radar can be composited on a single image. As with most other data sources, a simple macro establishes the loops and scheduling of the radar ingestions as well as the autodialing. There are approximately 60 NWS network 10 cm radars that can be interrogated. NSSFC forecasters have found this data source to be extremely helpful in severe weather situations. The capability to access lightning frequency data stored in a National Weather Service computer was added. Plans call for an interface with the National Meteorological Center to receive and display prognostic fields from operational computer forecast models. Programs are to be developed to plot and display locations of reported severe local storm events.
A.R.H.

N84-34891*# National Severe Storms Forecast Center, Kansas City, Mo.
NSSFC: VAS ASSESSMENT ACTIVITIES Abstract Only
Richard W. Anthony and Preston W. Leftwich *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 211 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Vertical atmospheric sounder data were evaluated. Basic work thus far has been directed toward evaluating, over the in near real time to determine the instrument's ability to detect regions with potential for severe storm development. A real time hourly water vapor loop 16 hours daily provides data to monitor position and trends of mid and upper level meteorological features. Because water vapor is more uniform than clouds, the water vapor images improve the ability to monitor certain atmospheric features such as jets, shortwaves, vorticity centers, and subsidence zones. Additional products to be evaluated include a version of the split window developed by NASA and cloud drift winds generated from three hourly sequenced CO2 VAS channels. A technique also under evaluation at NSSFC provides hail size potential based on VAS sounding data. Part of a planned upgrade to CSIS linking the 2400 baud phone line to one of the CSIS CPUs to allow access to VAS data via CSIS.
A.R.H.

N84-34892*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A STATISTICAL EVALUATION AND COMPARISON OF VISSR ATMOSPHERIC SOUNDER (VAS) DATA
Gary J. Jedlovec *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 213-215 refs (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

In order to account for the temporal and spatial discrepancies between the VAS and rawinsonde soundings, the rawinsonde data were adjusted to a common hour of release where the new observation time corresponded to the satellite scan time. Both the satellite and rawinsonde observations of the basic atmospheric parameters (T Td, and Z) were objectively analyzed to a uniform grid maintaining the same mesoscale structure in each data set. The performance of each retrieval algorithm in producing accurate and representative soundings was evaluated using statistical parameters such as the mean, standard deviation, and root mean square of the difference fields for each parameter and grid level. Horizontal structure was also qualitatively evaluated by examining atmospheric features on constant pressure surfaces. An analysis of the vertical structure of the atmosphere were also performed by looking at colocated and grid mean vertical profiles of both

the satellite and rawinsonde data sets. Highlights of these results are presented. A.R.H.

N84-34893*# Texas A&M Univ., College Station.
VAS SOUNDING DATA EVALUATION
James R. Scoggins *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 217-220 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

The VAS soundings derived by NOAA personnel and NASA personnel and rawinsonde soundings are compared: (1) directly by plotting on Skew t-log p diagrams; (2) by pairing rawinsonde soundings with the closest satellite soundings and calculating the mean and standard deviations of differences between the two data sets; and (3) by constructing synoptic and subsynoptic scale analyses with rawinsonde and satellite data. Differences for various parameters are discussed. A.R.H.

N84-34894*# Wisconsin Univ., Madison.
EVALUATION AND DEVELOPMENT OF NEW VAS REMOTE SENSING ALGORITHMS Abstract Only
William L. Smith and W. Paul Menzel *In* NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 219-220 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

An algorithm, developed to permit the simultaneous retrieval of temperature/moisture profiles and surface skin temperature by direct analytical solution of the radiative transfer equation, alleviates the problem associated with the interdependencies of water vapor retrieval on temperature retrieval and their dependencies on surface emissions. Simultaneous solution of all these quantities is achieved in one calculation using the available radiance observations. Since only a single matrix inversion is required for the specification of all parameters, the solution is computationally efficient. Ancillary observations of temperature and/or moisture from surface sensors on aircraft can be readily incorporated into the solution. Simulation tests of the method indicate improved performance over the previous iterative technique, particularly for the lower troposphere and for water vapor. A.R.H.

N84-34895*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AUTOMATED MESOSCALE WINDS DERIVED FROM GOES MULTISPECTRAL IMAGERY Abstract Only
Gregory S. Wilson and Robert J. Atkinson (General Electric, Huntsville, Ala.) *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 221-222 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

An automated technique for extracting mesoscale winds from sequences of GOES VISSR image pairs was developed, tested and configured for quasi-real time/research applications on a computing system which gives mesoscale wind estimates at the highest spatial/temporal resolution possible from the VISSR imagery down to a wind vector separation of 10 km. Preprocessing of imagery using IR resampling, VIS edge preserving filtering, and reduced VIS resolution averaging improved height assignments and vector extraction for 10, 15, and 30 min imagery. An objective quality control system provides much greater than 99% accuracy in eliminating questionable wind estimates. Automated winds generally have better spatial coverage and density, and have random error estimates half as large as the manual winds. Dynamical analysis of cloud wind divergence revealed temporally consistent convergence centers on the meso beta scale that are highly correlated with on going and future developing convective storms. The entire system of computer codes was successfully vectorized for execution on an array processor resulting in job turnaround in less than one hour. A.R.H.

N84-34896*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SENSOR STUDIES AND SPACE FLIGHT OPPORTUNITIES Abstract Only
Gregory S. Wilson, James E. Arnold, Franklin R. Robertson, and Gary J. Jedlovec *In its* NASA/MSFC FY-84 Atmospheric Processes Res. Rev. Sep. 1984 p 223 (For primary document see N84-34829 24-47)
Avail: NTIS HC A10/MF A01 CSCL 04B

Science issues, definition, instrument design studies, and hardware procurement for the multispectral atmospheric mapping sensor aircraft prototype, were all started and partially completed. The science issues for a shuttle atmospheric science experiment were defined around the precipitation processes question and results submitted and accepted for publication. Mission science objectives and payload definitions studies for the shuttle Earth observation experiment mission series were begun. A.R.H.

N84-34897*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
GROUND-BASED OBSERVATIONS OF EQUATORIAL THERMOSPHERE DYNAMICS WITH A FABRY-PEROT INTERFEROMETER Final Report, 1 Dec. 1982 - 30 Sep. 1984
John W. Meriwether, Jr. and Manfred A. Biondi 30 Sep. 1984 39 p refs Prepared in cooperation with Pittsburgh Univ., Pa.
(Grants NAG5-615; NSF ATM-81-21723; NSF ATM-82-02440) (NASA-CR-174005; NAS 1.26:174005) Avail: NTIS HC A03/MF A01 CSCL 04B

Fabry-Perot determinations of thermospheric temperatures from 630.0 nm nightglow line width measurements were carried out for the period April to August, 1983. The nightly variation of the thermospheric temperature measured on 53 nights is compared with MSIS model predictions and found to agree occasionally with the model but, on the average, to exceed model predictions by approximately 180 K. The largest differences, 400 to 500 K occur during strongly increasing geomagnetic activity. Significant differences occur both during high geomagnetic/low solar activity and during low geomagnetic/high solar activity. R.S.F.

N84-34898# World Climate Programme, Geneva (Switzerland).
REPORT OF THE PLANNING MEETING ON INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT (ISCCP)
1982 34 p Meeting held in Geneva, 9-12 Aug. 1982
(WCP-28) Avail: NTIS MF A01; print copy available at WMO, Geneva

The highlights of a meeting on the International Satellite Cloud Climatology Project (ISCCP) are given. The responsibilities of various world governments involved in ISCCP are enumerated. A schedule of important ISCCP events is presented. Future actions deemed necessary for the project are outlined. R.S.F.

N84-34899# World Climate Programme, Geneva (Switzerland).
THE INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT (ISCCP) PRELIMINARY IMPLEMENTATION PLAN
Apr. 1982 103 p refs
(WCP-20) Avail: NTIS MF A01; print copy available at WMO, Geneva

The basic objective of the International Satellite Cloud Climatology Project (ISCCP) is to take advantage of the global coverage provided by the planned international array of geostationary and polar orbiting meteorological satellites to provide, for the first time, a 5-year global cloud climatology. The specifications for such a climatology were established originally at Oxford (1978) and were refined at subsequent meetings (Balatonalmadi (1980) and Hamburg (1981)). The main and most important characteristic of the cloud climatology sought will be its globally uniform coverage of various indices of cloud cover, rather than the absolute accuracy of its representation of a particular cloud type in any particular area. Complimentary studies are required within the framework of the WCRP to determine the radiative properties of cloud fields described by the ISCCP. This Preliminary Implementation Plan, is based largely on material developed at a workshop on the scientific aspects of the ISCCP held in Hamburg in August 1981. Although the general approach described in the first ISCCP report was maintained, many details of the strategy for assembling the data sets were modified and refined. B.W.

N84-34900# World Climate Programme, Geneva (Switzerland).
WMO PROJECT ON RESEARCH AND MONITORING OF ATMOSPHERIC CO2. REPORT OF THE WMO(CAS) MEETING OF EXPERTS ON THE CO2 CONCENTRATIONS FROM PRE-INDUSTRIAL TIMES TO I.G.Y.
Rumen D. Bojkov, ed. 1983 45 p Meeting held at Boulder, Colo., 22-25 Jun. 1983
(Rept-1; WCP-53) Avail: NTIS MF A01; print copy available at WMO, Geneva

A review is given of old measurements of atmospheric CO2, with particular reference to late 19th century values. Most of these measurements were made in Europe and show a wide variety of values. Spectroscopy solar spectra data, ice core data, and ocean water data were examined. R.J.F.

N84-34901# Air Force Geophysics Lab., Hanscom AFB, Mass.
HANDBOOK OF GEOPHYSICS AND SPACE ENVIRONMENTS. CHAPTER 16: WATER VAPOR, PRECIPITATION, CLOUDS AND FOG, REVISED
D. D. Grantham, I. I. Gringorten, E. A. Bertoni, A. J. Kantor, and P. Tattelman 18 Jul. 1983 24143 p
(AD-A144176; AFGL-TR-83-0181-Ch-16-Rev; AFGL-ERP-845-Ch-16-Rev) Avail: NTIS HC A07/MF A01 CSCL 04/2

Water vapor, precipitation, clouds, lines-of-sight, and fog are discussed in this report. Information on rainfall rates, hail, snowfall, satellite and radar observations of clouds, clear and cloud-free lines-of-sight, water content of clouds, fog, and visibility are included. The information in this report will also be Chapter 16 of the 1983 Handbook of Geophysics and Space Environments. GRA

N84-34902# Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
METEOROLOGICAL AND CLIMATOLOGICAL CONDITIONS AFFECTING THE VERTICAL STRUCTURE OF VISIBILITY IN NORTHERN GERMANY Interim Report, Jul. 1983 - Jun. 1984
R. Roth Jul. 1984 16 p
(Contract DAJA37-82-C-0189; DA Proj. 1T1-61102-BH-57)
(AD-A144352; IR-5) Avail: NTIS HC A02/MF A01 CSCL 04/2

Statistics are now complete for all of 1983. Data include frequency distributions of visibility for six height levels. The distributions show a maximum of about 10 km visibility at the 2 m level. With increasing height this maximum moves to a visibility range of about 40 km. Low visibilities are causes chiefly by fog in the 2 - 60 m levels, and by clouds in the 60 - 297 m levels. GRA

N84-34903# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ATMOSPHERIC ICING ON SEA STRUCTURES
L. Makkonen Apr. 1984 103 p
(AD-A144448; CRREL-MONO-84-2) Avail: NTIS HC A06/MF A01 CSCL 08/12

Atmospheric icing (icing due to fog, precipitation and water vapor in air) as a physical process and the problems it causes for ships and stationary offshore structures are reviewed. Estimation of the probability and severity of atmospheric icing based on climatological and geographical factors is discussed, and theoretical methods for calculating the intensity of atmospheric icing at sea are suggested. Existing data on the dependence of the atmospheric icing rate and the properties of the accreted ice on the meteorological conditions are analyzed. The methods of measuring the icing rate and ice prevention methods are discussed. GRA

N84-34904# Systems Control Technology, Inc., Palo Alto, Calif.
CLOUD BANDS STRUCTURE OF HURRICANE DAVID, 1979: A CASE STUDY Final Report
F. H. Nicholson Jun. 1984 47 p
(Contract N62271-81-M-2095; F59-551)
(AD-A144529; NEPRF-CR-84-04) Avail: NTIS HC A03/MF A01 CSCL 04/2

The nature of the spiral banding of Hurricane David immediately before, during, and after a period of intensification is examined. The tropical cyclone spiral banding features are analyzed by the Tactical Environmental Display System (TEDS) program on the NAVENVPREDRSCHFAC Satellite-data Processing and Display System (SPADS). Results show that a secondary energy maximum exists in the spiral spectrum during the hurricane's intensification period, and that the behaviors of the eye do not seem to correlate with the intensification of the storm. Author (GRA)

N84-34725# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Service d'Aeronomie.
SPACEBORNE LIDAR APPLICATIONS TO METEOROLOGY AND ENVIRONMENTAL STUDIES
G. Megie, J. Pelon, and P. Flamant *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 7 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34746# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. for Atmospheric Physics.
MAPPING OF ARCTIC HAZE USING AIRBORNE LIDAR
W. Renger, P. Moerl, P. Wendling (Stockholm Univ.), and J. Heintzenberg *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 5 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34750# Royal Signals and Radar Establishment, Malvern (England).
WIND MEASUREMENT WITH COHERENT LASER RADAR AT 10 MICRONS
J. M. Vaughan and A. A. Woodfield *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 8 p refs (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-35047# National Central Univ., Chung-Li (Taiwan).
MODEL STUDY OF THE ATMOSPHERIC FRONTOGENESIS. 2: THEORETICAL MODEL Abstract Only
Huo-Ming Jian and Siu-Shung Hong *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 20-21 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-35048# Central Weather Bureau (Taiwan).
A STUDY OF TROPICAL CYCLONE INTENSITY FROM SATELLITE IMAGERY Abstract Only
Ling-Hsiao Chang and Shu-Gwun Chu *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 26-27 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35049# Chung Cheng Inst. of Tech. (Taiwan).
AN AUTOMATED TECHNIQUE FOR DETERMINING CLOUD VELOCITY FROM GMS DATA. 1: THE DESIGN AND CONSTRUCTION OF A SCANNING CONVERTER Abstract Only
Liang-Shur Su and Tsen-Bar Tsi *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 31-32 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N84-34905*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHODOLOGY FOR INTERPRETATION OF SST RETRIEVALS USING THE AVHRR SPLIT WINDOW ALGORITHM
R. W. Barbieri, C. R. McClain, and D. L. Endres Sep. 1983 57 p refs
(NASA-TM-85100; NAS 1.15:85100) Avail: NTIS

HC A04/MF A01 CSCL 08J

Intercomparisons of sea surface temperature (SST) products derived from the operational NOAA-7 AVHRR-II algorithm and in situ observations are made. The 1982 data sets consist of ship survey data during the winter from the Mid-Atlantic Bight (MAB), ship and buoy measurements during April and September in the Gulf of Mexico and shipboard observations during April off the N.W. Spanish coast. The analyses included single pixel comparisons and the warmest pixel technique for 2 x 2 pixel and 10 x 10 pixel areas. The reason for using multi-pixel areas was for avoiding cloud contaminated pixels in the vicinity of the field measurements. Care must be taken when applying the warmest pixel technique near oceanic fronts. The Gulf of Mexico results clearly indicate a persistent degradation in algorithm accuracy due to El Chichon aerosols. The MAB and Spanish data sets indicate that very accurate estimates can be achieved if care is taken to avoid clouds and oceanic fronts. Author

N84-34906# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

CONTOURING PROGRAM FOR GENERATION OF SEA SURFACE TEMPERATURE MAPS

Merritt Raymond Stevenson Aug. 1984 26 p ref

(INPE-3260-RPE/464) Avail: NTIS HC A03/MF A01

A FORTRAN program written for the purpose of generating two-dimensional contoured fields of sea surface temperature is described. The program accepts temperature data that are spatially equispaced from punched cards and generates a set of points corresponding to each contour line of the specified contour interval. The program user specifies the contour interval and the program determines the range of values present in the data field and the number of contours to be generated. A search method is used whereby the boundaries of the data array are examined for the presence of contour lines. Then the search proceeds to the interior of the data field. The program readily detects isolated maximum and minimum temperature features. The output data representing the individual contour lines are smoothed before the lines are drawn by the Calcomp plotter. The program is set for a 15 deg x 15 deg (latitude x longitude) area and the Brazilian coastline corresponding to the general area is drawn onto the chart, prior to constructing the contoured temperature field. As given in this report, the program uses a 10 inch Calcomp plotter machine.

Author

N84-34907# Army Cold Regions Research and Engineering Lab., Hanover, N. H.

MECHANICAL PROPERTIES OF MULTI-YEAR SEA ICE. PHASE 1: TEST RESULTS

G. F. N. Cox, J. A. Richter-Menge, W. F. Weeks, M. Mellor, and H. Bosworth Apr. 1984 114 p

(AD-A144132; CRREL-84-9) Avail: NTIS HC A06/MF A01 CSCL 08/12

This report presents the results of the first phase of a test program designed to obtain a comprehensive understanding of the mechanical properties of multi-year sea ice from the Alaskan Beaufort Sea. In Phase I, 222 constant-strain-rate uni-axial compression tests were performed on ice samples from ten multi-year pressure ridges to examine the magnitude and variation of ice strength within and between pressure ridges. A limited number of constant-strain-rate compression and tension tests, constant-load compression tests, and conventional triaxial tests were also performed on ice samples from a multi-year floe to provide preliminary data for developing ice yield criteria and constitutive laws for multi-year sea ice. Data are presented on the strength, failure strain, and modulus of multi-year sea ice under different loading conditions. The statistical variation of ice strength within and between pressure ridges is examined, as well as the effects of ice temperature, porosity, structure, strain rate and confining pressure on the mechanical properties of multi-year sea ice. GRA

N84-34908# Army Cold Regions Research and Engineering Lab., Hanover, N. H.

MECHANICAL PROPERTIES OF MULTI-YEAR SEA ICE. TESTING TECHNIQUES

M. Mellor, G. F. N. Cox, and H. Bosworth Apr. 1984 44 p

(AD-A144431; CRREL-84-8) Avail: NTIS HC A03/MF A01 CSCL 08/12

This report describes the equipment and procedures that were used for acquiring, preparing and testing samples of multi-year sea ice. Techniques and procedures are discussed for testing ice samples in compression and tension at constant strain rates and constant loads, as well as in a conventional triaxial cell. A detailed account is given of the application and measurement of forces and displacements on the ice test specimens under these different loading conditions. GRA

N84-34909# Lamont-Doherty Geological Observatory, Palisades, N. Y.

ARCTIC PHYSICAL OCEANOGRAPHY Final Technical Report, 1 Jul. 1975 - 31 Dec. 1983

K. Hunkins Jul. 1984 39 p

(Contract N00014-76-C-0004)

(AD-A144596) Avail: NTIS HC A03/MF A01 CSCL 08/3

The physical oceanography of the Arctic Ocean has been investigated on three different field expeditions: AIDJEX ('75-76), FRAM ('79-82), and MIZEX (1983). The locations of these expeditions cover the range of Arctic Ocean environments from the polar park of the Beaufort Sea to the ice edge in Fram Strait. Meso- and fine-scale oceanographic structure in these areas was monitored with hydrographic profiles taken from drifting ice stations and at remote sites reached by helicopter. Ocean currents were monitored by both profiling and fixed current meters suspended from drifting ice stations. A bibliography is included of scientific papers and technical reports covering accomplishments under this contract. Author (GRA)

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N84-34910# Hughes Aircraft Co., Long Beach, Calif. Support Systems.

A STUDY OF THE INTERACTION OF MILLIMETER WAVE FIELDS WITH BIOLOGICAL SYSTEMS Final Report

A. Lawrence, B. Pierce, J. McDaniel, and D. Chang Jul. 1984 57 p

(Contract N00014-83-C-0010)

(AD-A144150) Avail: NTIS HC A04/MF A01 CSCL 06/18

Our study of the interaction of millimeter wave fields with biological systems has concentrated on Davydov's model of soliton formation in alpha-helices. A qualitative understanding has been obtained for the oscillatory modes of proteins in the millimeter and submillimeter regions of the electromagnetic spectrum. Four separate groups of frequencies are found to exist in short alpha-helices, ranging from 200 gigahertz to 6 terahertz. In long alpha-helices, soliton trapping is predicted for multiquanta excitation at zero temperature, while the existence of solitons at room temperature is called into question. A molecular orbital calculation of the exciton-phonon coupling constant in the formamide dimer suggests that the value of this critical constant still needs to be determined. The results point up the need for further molecular orbital calculations and experimental verification in order to understand the interaction of millimeter waves with biological systems. GRA

N84-34911# Office of Naval Research, London (England).

BIOELECTROMAGNETICS RESEARCH IN WEST GERMANY: AN ASSESSMENT

T. C. Rozzell 2 Jul. 1984 12 p

(AD-A144297; ONRL-R-9-84) Avail: NTIS HC A02/MF A01 CSCL 06/2

This report highlights some of the key research that has been carried out in Germany on millimeter-wave effects during the past

2 to 4 years. In addition, the report examines other bioelectromagnetics research related to biological effects as well as diagnostic and therapeutic applications. Author (GRA)

N84-34912# Office of Naval Research, London (England).
BIOELECTROMAGNETICS RESEARCH IN FRANCE: AN ASSESSMENT
T. C. Rozzell 29 Jun. 1984 14 p
(AD-A144305; ONRL-R-8-84) Avail: NTIS HC A02/MF A01 CSCL 06/18

Over the past decade, France has played a major research role in bioelectromagnetics (BEM) (studies of the interaction of electromagnetic fields with biological systems). While the total French program was moderate compared with those of other countries, the contributions it made were highly significant and had an impact on almost every area of the field. This report examines recently completed BEM research and discusses some work done over the past 3 to 5 years. GRA

N84-35053# National Taiwan Univ., Taipei.
APPLICATION OF COMPARTMENTALIZATION/AIR LOCK OF SIMULATED PRESSURIZED AIRCRAFT AND TOLERANCE OF LUNG TO RAPID DECOMPRESSION IN DIFFERENT LABORATORY ANIMALS Abstract Only
Hwai-Sze Fang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 100 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N84-34913* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPARATUS FOR DISINTEGRATING KIDNEY STONES Patent
Earl D. Angulo, inventor (to NASA) Issued 2 Oct. 1984 7 p Filed 13 May 1982 Supersedes N82-26961 (17 - 20, p 2451)
(NASA-Case-GSC-12652-1; US-Patent-4,474,180; US-Patent-Appl-SN-377891; US-Patent-Class-128-328; US-Patent-Class-128-24-A) Avail: US Patent and Trademark Office CSCL 06B

The useful life of the wire probe in an ultrasonic kidney stone disintegration instrument is enhanced and prolonged by attaching the wire of the wire probe to the tip of an ultrasonic transducer by means of a clamping arrangement. Additionally, damping material is applied to the wire probe in the form of a damper tube through which the wire probe passes in the region adjacent the transducer tip. The damper tube extends outwardly from the transducer tip a predetermined distance, terminating in a resilient soft rubber joint. Also, the damper tube is supported intermediate its length by a support member. The damper system thus acts to inhibit lateral vibrations of the wire in the region of the transducer tip while providing little or no damping to the linear vibrations imparted to the wire by the transducer.
Official Gazette of the U.S. Patent and Trademark Office

N84-34914*# Tufts Univ., Boston, Mass. Dept. of Anatomy and Cellular Biology.
THE COMBINED INFLUENCE OF STRETCH, MOBILITY AND ELECTRICAL STIMULATION IN THE PREVENTION OF MUSCLE FIBER ATROPHY CAUSED HYPOKINESIA AND HYPODYNAMIA Semiannual Progress Report, Jan. - Jun. 1984
Geoffrey Goldspink, David Goldspink, and Paul Loughna Jun. 1984 60 p refs
(Grant NAG2-272)
(NASA-CR-173994; NAS 1.26:173994; SAPR-1) Avail: NTIS HC A04/MF A01 CSCL 06P

The morphological and biochemical changes which occur in the hind limb muscles of the rat in response to hypokinesia and hypodynamia were investigated. Hind limb cast fixation and suspension techniques were employed to study the muscular atrophy after five days of hypokinesia and hypodynamia induced by suspension, appreciable muscular atrophy was apparent, particularly in the anti-gravity muscles. The effect of passive stretching and electrical stimulation on muscle atrophy was studied. Changes in muscle protein mass were assessed with spectrophotometric and radioactive techniques. Passive stretch is shown to counteract muscle disuse atrophy. The change in the numbers of specific muscle fibers in atrophied muscles is discussed. R.S.F.

N84-34915# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. for Behavioral Sciences.
DEVELOPMENT OF A GENERAL MODEL OF THE CAR DRIVERS EYE MOVEMENT SEQUENCES AND EFFECTS OF SUBJECT AND ENVIRONMENTAL VARIABLES Final Report, 13 Mar. 1980 - 13 Mar. 1981
A. S. Cohen and R. Hirsig May 1984 204 p
(Contract DAJA37-80-C-0255; DA Proj. 2Q1-61102-B-74-D)
(AD-A144180; ARI-RN-84-74) Avail: NTIS HC A10/MF A01 CSCL 05/10

The present study represents the continuation of past research on the driver's eye movement behavior. Previous experiments yield to describe the driver's eye movement behavior in terms of time discrete process models. The established models were not perfectly accurate in predicting the driver's future fixations of the eye. The current goal was, first, to study whether any previous presupposition was not fulfilled, or whether, secondly, there exists some upper limit regarding the causal relationship between the successive fixations of the eye. The conducted experiments empirically support the validity of the prepositions. The results also yield that a driver's visual search depended on his long-term variables. The observed eye movement behavior represented a visual adaptation to the environmental conditions. The degree of adaptation depended, however, on the individual's capabilities. GRA

N84-34916# Letterman Army Inst. of Research, San Francisco, Calif.
LASER RETINAL INJURY Final Report, Jan. - Jul. 1983
J. A. Wolfe 11 Apr. 1984 25 p
(DA Proj. 3S1-62772-A-874)
(AD-A144187; LAIR-177) Avail: NTIS HC A02/MF A01 CSCL 06/18

Laser retinal injury poses a grave threat to military personnel. Both irreversible damage with potential lifelong visual disability and reversible injury with immediate interference when critical visual demands are needed can occur. Laser retinal lesions can be graded ophthalmoscopically: Grade I - retinal edema; Grade II - retinal necrosis (coagulation); Grade III - retinal hemorrhage; Grade IV - vitreous hemmorrhage and/or retinal hole formation. All 23 medically reported cases of laser retinal injury show that acute visual effects and permanence of visual disability are directly correlated with increasing grade of injury and closeness of lesion to the fovea. Laser protective eyewear gives protection only from specific wavelength(s) of laser radiation. GRA

N84-34917# Letterman Army Inst. of Research, San Francisco, Calif.
VISUAL FUNCTION CHANGES AFTER LASER EXPOSURE Final Report, 1973 - 1983
H. Zwick Apr. 1984 32 p
(AD-A144210; LAIR-84-48) Avail: NTIS HC A03/MF A01 CSCL 06/18

Contents: Visual Function Changes after Chronic or Low-light Exposure, and Experimental Assessments of Vision Changes in the Non-human Primate following Acute Laser Exposures. GRA

N84-34918# Smith-Kettlewell Inst. of Visual Sciences, San Francisco, Calif.
THE MECHANISM OF HUMAN VELOCITY DISCRIMINATION Annual Scientific Report, 1 Oct. 1983 - 30 Mar. 1984
S. P. McKee 9 Apr. 1984 11 p
(Grant AF-AFOSR-0345-82)

(AD-A144527; AFOSR-84-0702TR) Avail: NTIS HC A02/MF A01 CSCL 05/10

Human velocity discrimination depends on the precise detection of minute time variations (under 1 msec). A physiological summation process called sequential recruitment is responsible for this remarkable temporal sensitivity. Precise velocity discrimination is possible with very brief target durations (less than 100 msec). The oculomotor systems used this sensory signal to initiate smooth pursuit eye movements. GRA

N84-34782# Melbourne Univ., Parkville (Australia).
THE TIME IT TAKES TO SEE
G. Stanley and M. G. King (Defence Centre, Melbourne) *In* Melbourne Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 12-17 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34783# Materials Research Labs., Melbourne (Australia).
COGNITIVE PROCESSES IN TARGET ACQUISITION
C. J. Woodruff *In its* Extracts from Symp.: Countersurveillance 1983 May 1984 p 18-22 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34784# Defence Centre, Melbourne (Australia).
DETECTING CAMOUFLAGED TARGETS: THEORY INTO PRACTICE
Michael G. King and Gordon Stanley (Melbourne Univ.) *In* Materials Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 23-32 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34933# Walter Reed Army Inst. of Research, Washington, D.C. Dept. of Military Medical Psychophsiology.
COMPLEX DEMODULATION: A TECHNIQUE FOR ASSESSING PERIODIC COMPONENTS IN SEQUENTIALLY SAMPLED DATA
H. C. Sing, S. G. Genser, H. Babkoff, D. R. Thorne, and F. W. Hegge *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 131-156 (For primary document see N84-34927 24-59)
(AD-P003845) Avail: NTIS HC A17/MF A01 CSCL 12/1

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N84-34919# Loughborough Univ. of Technology (England). Dept. of Mechanical Engineering.
RESULTS OF A QUESTIONNAIRE ON THE TEACHING OF COMPUTER-AIDED ENGINEERING (CAE) ON UNDERGRADUATE COURSES
Ian Wright, Lloyd Jenkinson, and Richard Angrave Jun. 1984 54 p
(TT-8404) Avail: NTIS HC A04/MF A01

A project to produce resource teaching material on Computer Aided Engineering (CAE) for use in engineering undergraduate courses is discussed. The project includes a survey to assess current teaching from 79% of the 295 establishments contacted. Results show that the number of establishments teaching CAE has increased steadily. Staff shortages, access to in house developed software, and inadequate resource materials are some of the problems addressed. E.R.

N84-34920# Missouri Univ., Columbia.
ANALYSIS OF REWARD FUNCTIONS IN LEARNING: UNCONSCIOUS INFORMATION PROCESSING: NONCOGNITIVE DETERMINANTS OF RESPONSE STRENGTH Final Report, Sep. 1978 - 15 Sep. 1982
M. H. Marx May 1984 26 p
(Grant MDA903-78-G-0008; DA Proj. 2Q1-61102-B-74-F)
(AD-A144152; ARI-RN-84-76) Avail: NTIS HC A03/MF A01 CSCL 05/10

Our overall objective was to investigate the role of non-cognitive determinants of response strength. The more specific objective was to determine whether rewarded responses are differentially processed, as revealed by analysis of their subliminal processing. The major focus of the research was to ascertain the reality of claims. For example, that graphemic and semantic processing persists in spite of the subjects' inability to identify pattern-masked visual cues. In spite of timing limitations associated with the 60 Hz refreshing of our CRT display, we found consistent suprachance selection of test alternatives that were graphemic, phonemic, and semantic associates of the target words, in the absence of any ability to identify the target words themselves. Control stimulations (blanks) produced chance performance. It was concluded that these results (1) offer support for the reality of subliminal or unconscious information processing, (2) indicate the feasibility of subliminal testing of the hypothesized differential processing of rewarded responses, and (3) suggest the potential utility of adapting subliminal stimulation techniques as training procedures designed to enhance perceptual skills under severely degraded stimulus conditions, such as the detection of hidden targets in military operations. GRA

N84-34921# Perceptronics, Inc., Woodland Hills, Calif.
OPERATOR ALERTNESS/WORKLOAD ASSESSMENT USING STOCHASTIC MODEL-BASED ANALYSIS OF MYOELECTRIC SIGNALS Interim Report, 1 Oct. 1982 - 31 Mar. 1984
A. M. Madni, R. I. Scopp, Y. Y. Chu, and D. D. Purcell 30 Apr. 1984 97 p
(Contract F49620-83-C-0001)
(AD-A144535; PPR-1126-84-4; AFOSR-84-0703TR) Avail: NTIS HC A05/MF A01 CSCL 05/9

This interim report documents the work done to this point on autoregressive integrated moving average (ARIMA) model based analysis of myoelectric signals. The ARIMA modelling procedure and the hardware required for collecting myoelectric data are described in detail. Pattern analysis methods for characterizing the myoelectric signals under different levels of alertness/workload are discussed. Additionally, the various tasks in the experimental control package that subjects must perform while being monitored are described. Finally, an analysis of data obtained during experimental sessions is provided giving some indication of discriminability of the ARIMA signatures over different task difficulty levels and subjects. Results of this analysis indicate that the first AR parameter is the most useful feature in differentiating workload/alertness level. Additionally, this feature was shown to be reliable for each underlying level of alertness or load in a given task. GRA

N84-34922# Washington Univ., St. Louis, Mo. Behavior Research Lab.
A PSYCHOPHYSIOLOGICAL MAPPING OF COGNITIVE PROCESSES Progress Report, 1 Mar. 1983 - 29 Feb. 1984
J. A. Stern and R. Goldstein 4 May 1984 10 p
(Contract F49620-83-C-0059)
(AD-A144557; Rept-0059-84-1; AFOSR-84-0701TR) Avail: NTIS HC A02/MF A01 CSCL 05/10

This technical report consists of a description of the work done in the Washington University Behavior Research Laboratories supported by the AFOSR. The text describes the hardware assembled for the proposed studies and the software which has been developed for stimulus presentation and execution. The study format is described as well as some preliminary results bearing on the issues to be addressed. Author (GRA)

N84-34923# Georgia Inst. of Tech., Atlanta. School of Psychology.
ESTIMATING THE NUMBER AND DURATION OF COGNITIVE PROCESSES USING THE WITHIN-TASK SUBTRACTIVE METHOD Final Technical Report, 15 Apr. 1983 - 14 Apr. 1984
G. M. Corso and M. J. Patterson 30 Jun. 1984 63 p

(Grant AF-AFOSR-0068-83)
(AD-A144617; AFOSR-84-0696TR) Avail: NTIS HC A04/MF A01 CSCL 05/10

This research was directed towards developing a methodology for partitioning choice-reaction time into component parts, using both the additive-factor and the subtractive method. This methodology involved the use of a modified Sternberg task in which the subjects viewed two horizontally presented letters and were required to classify each of the letters into either the positive or negative set. The classification procedure was performed by depressing two response keys on the same trial. Latency measures were obtained for the elapsed time between stimulus onset and the first response and between the first response and the second response. Input and output times were then derived. In addition, three different types of interruption stimuli (auditory, visual and auditory-visual) were presented at various times prior to and after the onset of the classification stimulus. Input and output latencies were differentially influenced by the different types of interruption stimuli and by the onset time of those interruption stimuli. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N84-34924# Army Aeromedical Research Lab., Fort Rucker, Ala.
ENERGY-ABSORBING EARCUP ENGINEERING FEASIBILITY EVALUATION
T. A. Hundley and J. L. Haley, Jr. Jul. 1984 32 p
(DA Proj. 3E1-62777-A-878)
(AD-A144179; USAARL-84-8) Avail: NTIS HC A03/MF A01 CSCL 06/17

The concept of using the integral structure of a noise-attenuating earcup as a load-limiting or energy-absorbing device is explored in this report. The standard earcup of the Army's SPH-4 flight helmet is a very rigid structure which requires a force of approximately 22,000 newtons to cause it to deform, a force level three times greater than the crushing strength of the skull. Fifteen different crushable earcups were constructed and evaluated for noise attenuation to determine their suitability for prototype construction. Three earcups were selected for the crushability evaluation. The corrugated aluminum earcup was selected as the best of the three evaluated. The aluminum earcup was modified to lower the cost and to increase the crushing depth to nearly 2 cm. The feasibility of producing a crushable earcup with similar noise attenuation characteristics to the existing Army SPH-4 earcup was demonstrated. GRA

N84-34925# Tactical Air Warfare Center, Eglin AFB, Fla.
F-15 LIMITED FIELD OF VIEW VISUAL SYSTEM TRAINING EFFECTIVENESS EVALUATION Final Report, 9 Jan. - 13 Apr. 1984
M. E. ONeal Jul. 1984 48 p Original contains color illustrations
(AD-A144309) Avail: NTIS HC A03/MF A01 CSCL 05/9

This report covers the F-15 Limited Field of View (LFOV) Visual System Training Effectiveness Evaluation. This evaluation was conducted at Goodyear Aerospace Corp., Akron, OH. The evaluation used F-15, F-16, and A-10 instructor pilots from Headquarters Tactical Air Command, Pacific Air Forces, Alaskan Air Command, and United States Air Forces in Europe. A visual system integrated with the F-15 Operational Flight Trainer (OFT) was evaluated to determine the training capability of the system for the initial and operational training of air superiority, air-to-surface combat, and transition tasks. The results of this evaluation will be used to determine if a LFOV visual system should be acquired for the F-15, F-16, and A-10 OFT. GRA

N84-34926# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Biomedical Engineering.
GAZE CONTROL DURING HORIZONTAL AND VERTICAL TARGET TRACKING Final Report
A. T. Bahill Mar. 1984 23 p
(Grant AF-AFOSR-0137-83)
(AD-A144484; AFOSR-84-0698TR) Avail: NTIS HC A02/MF A01 CSCL 05/10

The Honeywell oculometer has a noise level of about 0.1 deg(2): eye tracking is noisier than head tracking; vertical eye tracking is noisier than horizontal eye tracking. It has about 25% crosstalk of the horizontal channel into the vertical channel. It has an 84 ms time delay. It is not effective at detecting and rejecting eye blinks; typical eye blink artifacts last 50 to 200 ms. The human tracks best when tracking with eyes alone. Although tracking with head and eyes should be more natural, the human does worse when he uses his head. Head only tracking is the worst of the three conditions. GRA

N84-34408# Royal Aircraft Establishment, Bedford (England).
ASSESSING PILOT WORKLOAD IN FLIGHT
Alan H. Roscoe *In* AGARD Flight Test Tech. Jul. 1984 13 p refs (For primary document see N84-34396 24-01)
Avail: NTIS HC A16/MF A01

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N84-34927# Army Research Office, Research Triangle Park, N.C. Mathematics Steering Committee
PROCEEDINGS OF THE 29TH CONFERENCE ON THE DESIGN OF EXPERIMENTS IN ARMY RESEARCH, DEVELOPMENT AND TESTING
Jun. 1984 376 p Conf. held in Bethesda, Md., 19-20 Oct. 1983
(AD-A144261; AD-E401208; ARO-84-2) Avail: NTIS HC A17/MF A01 CSCL 15/3

This document presents papers in these research areas: Sequential Testing; Statistical Theory; Analysis of Longitudinal Data; Simulation Techniques and Applications; Test and Evaluation Techniques; and Application in Experimental Design. GRA

N84-34928# Army Research Office, Research Triangle Park, N.C. Mathematics Steering Committee
A COMBINED BAYES-SAMPLING THEORY METHOD FOR MONITORING A BERNOULLI PROCESS c65
R. L. Launer and N. D. Singpurwalla *In its* Proc. of the 29th conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 23-26 (For primary document see N84-34927 24-59)
(AD-P003840) Avail: NTIS HC A17/MF A01 CSCL 12/1

The author assumes a population of one-shot missiles which are stored in a ready or near ready state at the physical point of their deployment. He hopes that the missiles will sit in idle waiting for many years, but this allows environmental effects to degrade the missile's capability of successful deployment. Since even a brand new missile may fail to operate properly, and there are no important physical differences between the individual missiles in the given population, he assumes that a randomly selected missile will have a probability Pt of successful deployment, or reliability, at time t. It is obviously important to monitor Pt, so a sample of the missiles is tested periodically. Since the testing is destructive, the population is eventually depleted by the testing. Furthermore, defects in missile design may be uncovered, so modifications may be introduced which will have a tendency to increase the reliability.

For technical reasons, however, the author chose to describe a test which is designed to detect a deterioration in the reliability. GRA

N84-34929# Cornell Univ., Ithaca, N.Y. School of Operations Research and Industrial Engineering.

AN OPTIMAL SEQUENTIAL BERNOULLI SELECTION PROCEDURE c65

R. E. Bechhofer *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 27-48 (For primary document see N84-34927 24-59)

(Contract DAAG29-81-K-0168)

(AD-P003841) Avail: NTIS HC A17/MF A01 CSCL 12/1

This paper describes a new closed adaptive sequential procedure proposed by Bechhofer and Kulkarni for selecting the Bernoulli population which has the largest success probability. The performance of this procedure is compared to that of the Sobel-Huyett single-stage procedure, and to a curtailed version of the single-stage procedure, all of which guarantee the same probability of a correct selection. Optimal properties of the Bechhofer-Kulkarni procedure are stated; quantitative assessments of important performance characteristics of the procedure are given. These demonstrate conclusively the superiority of the new procedure over that of the competing procedures. Relevant areas of application are described. Appropriate literature references are provided. Author (GRA)

N84-34930# Wisconsin Univ., Madison. Mathematics Research Center.

A NEW METHOD OF EVALUATING NORMAL AND t-TAIL AREAS c65

A. P. Soms *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 49-54 (For primary document see N84-34927 24-59)

(Contract DAAG29-80-C-0041)

(AD-P003842) Avail: NTIS HC A17/MF A01 CSCL 12/1

The bounds of Boyd and Soms for the tail areas of the normal and t-distributions are used to obtain a new method of evaluating the tail areas. The absolute and relative errors and numerical examples are given. Author (GRA)

N84-34931# George Washington Univ., Washington, D.C. Inst. for Reliability and Risk Analysis.

THE DESIGN OF A QUANTAL RESPONSE EXPERIMENT: AN EMPIRICAL APPROACH c67

R. Soyer *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 55-96 (For primary document see N84-34927 24-59)

(Contracts N00014-77-C-0263; DAAG29-80-C-0067)

(AD-P003843; GWU/IRRA/TR-83/2) Avail: NTIS HC A17/MF A01 CSCL 12/1

An important issue in quantal response estimation problems considered by Mazzuchi and Singpurwalla is the design of the experiment. The objective there was to estimate the probability of response for a given stimulus, but due to the expense of the items, testing has to be kept to a minimum. As a continuation of the work by Mazzuchi and Singpurwalla (1982), this paper addresses the problem and presents a criterion for comparing several designs that are of interest. Author (GRA)

N84-34932# Army Logistics Center, Fort Lee, Va.

ON THE LEHMANN POWER ANALYSIS FOR THE WILCOXON RANK SUM TEST c65

J. R. Knaub, Jr. *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 107-130 (For primary document see N84-34927 24-59)

(AD-P003844) Avail: NTIS HC A17/MF A01 CSCL 12/1

The Wilcoxon Rank Sum (or Mann-Whitney) Test is among the most useful and powerful of the non-parametric hypothesis tests. However, as with many hypothesis tests, when a clear alternative hypothesis and corresponding power analysis is not present, the practical interpretation of results using this test suffers greatly. This paper presents and clarifies an alternative suggested by E. L. Lehmann in 1953 and provides tables of practical use which have not previously been calculated due to computational difficulties. Author (GRA)

N84-34933# Walter Reed Army Inst. of Research, Washington, D.C. Dept. of Military Medical Psychophysiology.

COMPLEX DEMODULATION: A TECHNIQUE FOR ASSESSING PERIODIC COMPONENTS IN SEQUENTIALLY SAMPLED DATA c52

H. C. Sing, S. G. Genser, H. Babkoff, D. R. Thorne, and F. W. Hegge *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 131-156 (For primary document see N84-34927 24-59)

(AD-P003845) Avail: NTIS HC A17/MF A01 CSCL 12/1

Circadian and other rhythmic components in data obtained from a sleep deprivation study are detected and characterized by complex demodulation. The output of this analytical technique yields both frequency and time domain representation of each periodic component of interest. Non-stationarity introduced by an experimental treatment such as progressive sleep loss, may be observed and quantified. The analytical results provide a common basis of comparison for data as diverse as cognition responses from a performance assessment battery, moodscale scores, and physiological data such as oral temperature. The procedure operates on the entire data set and variance accounted for by each component may be calculated. Author (GRA)

N84-34934# White Sands Missile Range, N.Mex.

EVALUATION OF OPTICAL DATA COLLECTION INSTRUMENTATION IN THE DESERT ENVIRONMENT c74

R. A. Dragon *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 167-171 (For primary document see N84-34927 24-59)

(AD-P003847) Avail: NTIS HC A17/MF A01 CSCL 20/6

The integration of new technologies such as video systems in place of current high-speed film cameras is discussed. For a great percentage of daytime activity the desert atmosphere is shown to be a limiting factor for the collection of visual data. The atmosphere and instrument focal lengths are hypothesized to be major considerations for instrument design both with film and video systems. An experiment using existing data and analysis of variance is suggested to evaluate the hypothesis. Author (GRA)

N84-34935# Army Operational Test and Evaluation Agency, Falls Church, Va.

A TYPE OF CORRELATED DATA IN OPERATIONAL TESTING c65

E. Hertz *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 173-176 (For primary document see N84-34927 24-59)

(AD-P003848) Avail: NTIS HC A17/MF A01 CSCL 12/1

During a portion of a test, N gunners fired two rounds apiece. The overall proportion of hits on first rounds was very close to the overall proportion of hits on second round shots. However, an individual gunner's performance on his second shot was positively correlated with his performance on the first round. The parameter of interest was p, the probability of hit using the firing device. The proportion of hits among the 2N shots was the natural point estimate of p. However, in calculating interval estimates for p at a given confidence level, or tests of hypothesis of the form p > or = p delta at a given significance level, the situation became more subtle. Since the first round outcome did not deterministically predict the second round outcome, we clearly had more information than just the N first round shots. On the other hand, the assumption that we had 2n independent trials was not justified. In this paper, a model is proposed for the analysis of this and similiar situations. This model generalizes the two round case and considers data in blocks when the observations within blocks are not independent. Author (GRA)

N84-34936# Army Materials and Mechanics Research Center, Watertown, Mass.

A SIMULATION PROCESS FOR DETERMINING RELIABILITY

OF CYCLIC RANDOM LOADED STRUCTURES c65
D. Neal, W. Matthews, and T. DeAngelis *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 177-201 (For primary document see N84-34927 24-59)
(AD-P003849) Avail: NTIS HC A17/MF A01 CSCL 12/1

A unique application of the Monte Carlo method was developed for determining reliability vs. cycles to failure of the M60 tank torsion bar. In applying the method, material torsional fatigue and spectrum loads were modelled such that variability in the functional parameters and operational loads were represented. Random torsional displacement values obtained from the amplitude displacement distributions applied to the fatigue equations resulted in an exponential distribution for cycles to failure of the in service bar. The number of simulations in the Monte Carlo process was determined from a convergence criteria involving stability of the third and fourth moments of the cycles to failure distribution. Reliability vs. bar life computations indicated a negligible amount of life after flaw initiation. Assuming a design change involving a twenty percent reduction in bar stresses increased the life estimates by a factor of three. An increase in reliability can also be realized if computations are made by assuming a bar has been in operation for a specified number of cycles. A comparison of minimum life (ninety nine percent probability of survival) between predicted and in service results showed excellent agreements (less than eight percent difference). Author (GRA)

N84-34937# Army Materiel Test and Evaluation Directorate, White Sands Missile Range, N. Mex.
RANDOM NUMBERS FROM SMALL CALCULATORS c64
D. W. Rankin *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 203-217 (For primary document see N84-34927 24-59)
(AD-P003850) Avail: NTIS HC A17/MF A01 CSCL 12/1

Random number generators are notoriously wasteful of digits; however, applying an augmented precision technique to a linear congruential generator enables one to produce on even a small calculator a set of pseudo-random numbers which contains a useful number of elements. This paper sets forth such a method.
Author (GRA)

N84-34938# Army Natick Research and Development Command, Mass.
ACCEPTANCE OF A MEAL AND ITS COMPONENTS: AN EXERCISE IN MISSING DATA c65
E. W. Ross *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 235-257 (For primary document see N84-34927 24-59)
(AD-P003852) Avail: NTIS HC A17/MF A01 CSCL 12/1

This paper is a study of the relation between the consumer acceptance of a meal and of the items that make up the meal. The primary purpose is to find a way of predicting overall meal-acceptance scores from the scores for the individual items in the Army field-ration system called the Meal, Ready-to-Eat. Attempts to do a linear regression encounter difficulties because of the large and non-random fraction of missing data. This problem is treated by a procedure that leads eventually to a single formula for the predicted overall meal scores. These predicted meal scores are then analyzed by the same methods used for the item scores. Stability results for meals are found using data from a storage study of the items after 24 months. Author (GRA)

N84-34939# Army Concepts Analysis Agency, Bethesda, Md.
NUMERICAL VALIDATION OF TUKEY'S CRITERION FOR CLINICAL TRIALS AND SEQUENTIAL TESTING c65
C. R. Leake *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 259-262 (For primary document see N84-34927 24-59)
(AD-P003853) Avail: NTIS HC A17/MF A01 CSCL 12/1

A basic problem in conducting either clinical or sequential trials is to determine which or when statistical significance for a predetermined level of alpha has occurred. The consequences of not using Tukey's criterion for k non-overlapping comparisons are developed. The use of this criterion might be too stringent, however, and an alternative statistic is given. GRA

N84-34940# Department of Energy, Washington, D. C.
A TECHNIQUE TO APPROXIMATE COMPLEX COMPUTER MODELS: AN APPROXIMATION OF THE TEISBERG MODEL c61
J. M. Tessmer *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 307-327 (For primary document see N84-34927 24-59)
(AD-P003855) Avail: NTIS HC A17/MF A01 CSCL 09/2

This paper presents a technique which was used to produce an approximation of a complex computer model, the Tiesberg Model. The technique employs a complete factorial design and uses the statistically significant effects as coefficients of the estimating equation. Author (GRA)

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N84-34941 Department of the Air Force, Washington, D.C.
DATA BUFFER APPARATUS BETWEEN SUBSYSTEMS WHICH OPERATE AT DIFFERING OR VARYING DATA RATES Patent
D. G. Frankel and M. J. Barrett Issued 31 Jul. 1984 7 p
(AD-D011206; US-Patent-4,463,443; US-Patent-Appl-SN-313861; US-Patent-Class-364-900) Avail: US Patent and Trademark Office CSCL 09/2

A data buffer apparatus to interface subsystem which operates at differing or varying data timing rates utilizing a random access memory unit for data storage is discussed. Input data is clocked into an input register synchronously with an input clock. A write/read sequence generator writes the input data from the input register into the random access memory unit. The write/read sequence generator read data out of the random access memory unit into an output holding register. The data from the output holding register is clocked at an output clock rate into the output data register from which the data is transferred out of the data buffer apparatus. Author (GRA)

N84-34942# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY
23 Feb. 1984 138 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UCC-84-001) Avail: NTIS HC A07

Research in the areas of cybernetics, computers, and automation technology is discussed. Computer aided manufacturing, controllers, signal processing, electro-optics, data base management systems and computer aided design are among the topics discussed. R.J.F.

N84-34943# Joint Publications Research Service, Arlington, Va.
STATUS OF SCIENTIFIC RESEARCH IN FIELD OF COMPUTER TECHNOLOGY IN COUNTRY'S VUZES
Yu. M. Smirnov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 1-5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 5-9 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

The basic directions of scientific research in the field of computer technology are considered and their status is evaluated. Examples of practical realization of research in the academic process and in industry are given. Computer programming, computer aided design, and computer graphics are discussed.
R.J.F.

N84-34944# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF IMPROVING MANAGEMENT OF USE OF COMPUTER TECHNOLOGY IN HIGHER SCHOOLS
A. Ya. Savelyev, N. M. Kogdov, B. A. Sazonov, and S. E. Lukyanov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 6-10 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 10-14 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

The need to account for, monitor and analyze the efficiency of computer use in the higher schools is substantiated and the software of the subsystem Computer technology, used in the OASU (automated sector management system) of the Minvuzes of the union republics and of the USSR Minvuz, are described. Author

N84-34945# Joint Publications Research Service, Arlington, Va.
COMPUTERS ON THE JOB
B. Konovalov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 13-17 Transl. into ENGLISH from Izv. (Moscow), 17 Sep. 1983 p 2 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

An institute doing research on computer aided design and manufacturing technologies is discussed. The institute primarily uses automated technology to create systems for automating scientific research and industrial processes. R.J.F.

N84-34946# Joint Publications Research Service, Arlington, Va.
AUTONOMOUS MICROPROCESSOR CONTROLLERS FOR SCIENTIFIC RESEARCH AUTOMATION SYSTEMS
A. B. Artamonov, L. K. Golovina, A. N. Zharikov, A. Kh. Mursayev, A. M. Smirnov, and Ye. P. Ugryunov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 22-28 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 61-66 (For primary document see N84-34942 24-60)
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The microprocessor controllers of information measuring systems are considered. The block diagrams are described and the operating characteristics of the CAMAC crate controller, based on microcircuits of sets K580, K589 and micropower controllers based on microprocessor sets K587 and K588, are presented. Author

N84-34947# Joint Publications Research Service, Arlington, Va.
MICROPROCESSORS FOR ANALOG SIGNAL PROCESSING
V. B. Smolov, Ye. P. Ugryunov, and I. V. Gerasimov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 29-34 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 67-71 (For primary document see N84-34942 24-60)
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The main problems in creating microprocessors for processing analog signals in integrated, modular and multiple board configurations are discussed. The results obtained at the computer department of the Leningrad Electrical Engineering Institute imeni V. I. Ul'yanov (Lenin) in developing the software and hardware and the program, linguistic and procedural support for devices of this class are discussed. Author

N84-34948# Joint Publications Research Service, Arlington, Va.
OPTOELECTRONIC PROGRAMMABLE LOGIC ARRAYS
S. K. Li, E. A. Mnatsakanyan, and V. I. Morozov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 35-41 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 4, Jul. - Aug. 1983 p 64-69 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

Despite LSI (large-scale integrated) circuit development being a major achievement in digital computer technology, the problem of diverse logic circuit production in small series remained unsolved since this entailed large inputs for LSI circuit design and production. To implement these logic circuits, programmable logic arrays (PLA's) have recently been developed and are being used more and more extensively in various computer hardware and digital automated machines. They are highly regular electronic logic circuits allowing computation of a set of specific disjunctive normal forms (DNF). Author

N84-34949# Joint Publications Research Service, Arlington, Va.
METHOD OF ACCELERATION OF ARITHMETIC CALCULATIONS
V. V. Barashenkov, O. G. Kokayev, V. G. Tarasov, and T. E. Temirkhanov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 42-46 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 25-29 (For primary document see N84-34942 24-60)
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A method of accelerating multiplication and division operations, extration of square root, binary-decimal conversions and calculation of elementary functions, performed by difference-iteractive and the number by number method is considered. The procedure of finding the next smallest number, performed by hardware in a specialized homogeneous associative processor, is used as a means for elimination of excess iteractions. Author

N84-34950# Joint Publications Research Service, Arlington, Va.
HIGH-PERFORMANCE SPECIALIZED PROCESSORS FOR CALCULATION OF ELEMENTARY AND SPECIAL FUNCTIONS
V. B. Smolov, A. I. Vodyakho, V. U. Plyusnin, and D. V. Puzankov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 47-53 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 30-34 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

Problems of design of specialized processors (SP) for calculation of elementary and special functions, oriented toward use in high-end models of YeS computers, are considered. Author

N84-34951# Joint Publications Research Service, Arlington, Va.
SYSTEM FOR RECORDING AND INPUT TO COMPUTER OF ONE-DIMENSIONAL IMAGES OF DIM OBJECTS AND HIGH-SPEED PROCESSES
Yu. V. Bondarenko, V. Ya. Budtsev, and A. N. Kasperovich *In its* Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 54-59 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 4, Jul. - Aug. 1983 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

The problem of recording optical images with brief duration and low intensity is relevant in the broad class of physical research of fast-flowing processes. Traditional photographic methods of recording an image from a screen of an electronic-optical converter, usually used to solve it, precludes the possibility of online monitoring and control over the course of a frequently expensive experiment, makes the procedure for input of the experiment data into a computer difficult and makes the processing of information processing lengthy and laborious. To solve this problem, systems based on highly sensitive transmitting television ELT (CRT's) combined with special-purpose minicomputers have recently been developed. With the appropriate software, these systems are an efficient tool for image recording and processing. The known foreign systems in this class are: OMA (Optical Multichannel Analyzer), OSA (Optical Spectra Analysis) and MfR (Microcomputer for Research). There are reports of development of domestic laboratory systems, but such equipment is not being produced by industry. Therefore, development of this type of recorder with a domestic element base and research of its capabilities are relevant. B.W.

N84-34952# Joint Publications Research Service, Arlington, Va.
SOFTWARE DEBUGGING DEVICES FOR MICROPROCESSORS c61
P. P. Sypchuk, A. D. Ivannikov, and I. D. Kurilovskiy *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-

84-001) 23 Feb. 1984 p 62-72 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 53-61 (For primary document see N84-34942 24-60)
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The classification of software debugging devices for microprocessors is presented. A program debugging system is considered for devices based on the K580IK80 microprocessor, which includes a cross system realized for the SM-4 computer, and an OKA-80 resident hardware-software complex. The composition of the hardware and software of the OKA-80 complex is described in detail and data organization for the KSI-1 cross system is presented. The resident and cross devices are described with analysis of their advantages and disadvantages with respect to design of hardware of various designation. Recommendations on applications are presented. Author

N84-34953# Joint Publications Research Service, Arlington, Va.
STRUCTURAL APPROACH TO DESIGN OF MULTIPROCESSOR DATABASE MANAGEMENT SYSTEM
N. P. Vashkevich, S. A. Zinkin, and V. P. Kulagin *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 73-84 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 15-24 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

The problems in the use of structured networks in the design of a multiprocessor database management system are considered. The development of a system that performs the division operation in a relational data base is described. E.A.K.

N84-34954# Joint Publications Research Service, Arlington, Va.
IMAGE INPUT/OUTPUT CONTROLLER-INTERFACE BASED ON 16-BIT MICROPROCESSOR
A. M. Ostapenko and V. A. Sluyev *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 85-92 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 4, Jul. - Aug. 1983 p 7-12 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

Image processing problems which are solved with systems which include a large complex of hardware and software are discussed. The class of computers used for processing data recorded on a photograph is quite specific, and the more complex the processing algorithm and greater the volume of source information obtainable in digitizing the photograph are, the higher the throughput and memory size required. The problem to obtain data like the systems aspect of operating with the computer I/O device is consiered. Problems of device control, buffering and transfer of data in the format required by the processing computer, providing necessary and where possible advanced facilities for interaction with respect to the specifics of the entire system as a whole are outlined. A system which includes an optronics image I/O unit and the SM-4 minicomputer connected by using a controller interface based on the TMS 9900 16 bit microprocessor is described. E.A.K.

N84-34955# Joint Publications Research Service, Arlington, Va.
INDUSTRIAL OPTODIGITAL INSPECTION SYSTEM c38
V. V. Vertoprakhov, S. V. Mikhlyayev, Yu. V. Chuguy, and V. P. Yunoshev *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 93-101 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 4, Jul. - Aug. 1983 p 53-59 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

The development of highly productive, noncontact, precision facilities for checking geometric parameters of products which is an urgent task in modern instrument making is discussed. In speed, precision and measuring range, the parameters achieved for these systems must fully meet inspection requirements. The known automatic optoelectronic systems allow checking products with a relatively simple shape in one or more sections. Modern industry needs monitors for checking products with more complex shapes; this requires information on product geometry measured in tenths or even hundredths of its sections. E.A.K.

N84-34956# Joint Publications Research Service, Arlington, Va.
IMPROVING AUTOMATED STATISTICAL DATA PROCESSING c61
Valeriy Nazarov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 111-116 Transl. into ENGLISH from Ekon. Sotrudnichestvo Stran-Chlenov SEV (Moscow), no. 7, Jul. 1983 p 67-69 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

The use of computer technology in statistical data processing, deeper economic analysis, and the use of mathematical methods is discussed. Automation in statistical data processing which is connected with the development of the Unified System (YeS) series of computers, third generation machines is outlined. The availability of similar computers operating on common principles provides real prerequisites for a transition from solving individual statistical problems to integrated systems of statistical data processing the organization of automated systems of state statistics (ASGS). The growth of the computer network in statistics has improved the activity on the automation of statistical data processing. E.A.K.

N84-34957*# Illinois Univ., Urbana. Dept. of Computer Science.
RESEARCH IN THE DESIGN OF HIGH-PERFORMANCE RECONFIGURABLE SYSTEMS Semiannual Status Report, 1 Apr. - 30 Sep. 1984
D. L. Slotnick, Scott D. McEwan, and Andrew J. Spry 1984 33 p
(Grant NAG5-377)
(NASA-CR-173998; NAS 1.26:173998; SASR-2) Avail: NTIS HC A03/MF A01 CSCL 09B

An initial design for the Bit Processor (BP) referred to in prior reports as the Processing Element or PE has been completed. Eight BP's, together with their supporting random-access memory, a 64 k x 9 ROM to perform addition, routing logic, and some additional logic, constitute the components of a single stage. An initial stage design is given. Stages may be combined to perform high-speed fixed or floating point arithmetic. Stages can be configured into a range of arithmetic modules that includes bit-serial one or two-dimensional arrays; one or two dimensional arrays fixed or floating point processors; and specialized uniprocessors, such as long-word arithmetic units. One to eight BP's represent a likely initial chip level. The Stage would then correspond to a first-level pluggable module. As both this project and VLSI CAD/CAM progress, however, it is expected that the chip level would migrate upward to the stage and, perhaps, ultimately the box level. The BP RAM, consisting of two banks, holds only operands and indices. Programs are at the box (high-level function) and system level. At the system level initial effort has been concentrated on specifying the tools needed to evaluate design alternatives. B.W.

N84-34958# Institute for Defense Analyses, Alexandria, Va.
C3I (COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE) INFORMATION SYSTEMS INTERNETWORK STUDY Final Report, Oct. 1982 - Dec. 1983
T. C. Bartee, O. P. Buneman, J. M. McQuillan, and S. T. Walker Apr. 1984 111 p
(Contract MDA903-79-C-0018)
(AD-A144271; AD-E500675; IDA-P-1774; IDA/HQ-84-28529) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report has four subjects: (1) An investigation of DoD protocol standards for computer communications. Emphasis is on the X2.5 protocol and a similar existing DDN protocol. (2) Local area network protocols are discussed with emphasis on security architecture. (3) A study of the logistics usage of AUTODIN and an analysis of a way to reduce the usage. (4) A study of data base management systems and their use in data communications systems. Interfaces to Ada are emphasized in this section. GRA

N84-34959# Army Construction Engineering Research Lab., Champaign, Ill.
EVALUATION OF MICROCOMPUTER ENERGY ANALYSIS PROGRAMS Final Report
L. K. Lawrie, W. Klock, and D. Leverenz Jul. 1984 49 p
(DA Proj. 4A1-62781-AT-45)
(AD-A144684; CERL-TR-E-193) Avail: NTIS HC A03/MF A01 CSCL 09/2

The evaluation was performed by comparing building simulations provided by micro programs to those provided by the Building Loads Analysis and System Thermodynamics (BLAST) program. The two micro programs chosen for evaluation (OPCOST and SASEAP) are representative of the type of bin method calculations used in simplified energy analysis procedures. The evaluation was based on four factors: (1) the ability of the programs to calculate overall annual building energy consumption, (2) their ability to study design options for developing energy-efficient new construction, (3) their ability to calculate energy savings from various building retrofit options, and (4) the amount of input information required which would be considered judgmental in nature as opposed to building description oriented. The results of the evaluation showed that the microcomputer energy analysis programs could reasonably predict the proper ranking of design alternatives or retrofit options. However, the programs could not accurately predict total annual energy consumption. Thus, the micro programs should not be used to determine compliance with energy budgets. Likewise, the micro programs could not predict the actual energy savings due to a design alternative or a retrofit option. The results did not clearly illustrate which design options were modeled accurately. GRA

N84-34960# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
28 Aug. 1984 52 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-033) Avail: NTIS HC A04/MF A01

A computer network for research and teaching is discussed. The ROSA microcomputer, automatic speech recognition, signal analysis, and pattern recognition are also considered. For individual titles, see N84-34961 through N84-34962.

N84-34961# Joint Publications Research Service, Arlington, Va.
DELTA COMPUTER NETWORK TO BE EXPANDED c62
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-033) 28 Aug. 1984 p 1-42 refs Transl. into ENGLISH from Rechentech. -Datenverarbeitung (East Berlin), v. 21, no. 5, May 1984 p 5-7 (For primary document see N84-34960 24-60)
Avail: NTIS HC A04/MF A01

The computer network for research and teaching (DELTA), which was established by institutions in the Dresden region college system, is discussed. The applications of the system to educational work are addressed and the software systems for network analysis and synthesis are enumerated. R.S.F.

N84-34962# Joint Publications Research Service, Arlington, Va.
NEW COMPUTER DEVELOPMENTS DESCRIBED
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-033) 28 Aug. 1984 p 43-49 Repr. from Polish Econ. News (Warsaw), 16 Jul. 1984 p 8-9 (For primary document see N84-34960 24-60)
Avail: NTIS HC A04/MF A01

The ROSA microcomputer, which is based on the INTEL 8080A microprocessor, is discussed. Automatic speech recognition, signal analysis, and pattern recognition are also considered. R.S.F.

N84-34963# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
26 Jul. 1984 49 p Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-027) Avail: NTIS HC A03/MF A01

Developments and trends in computer technology such as changes in microprocessor technology; initiation of microcomputer production; design and construction of an interschool computer network; and the social, economic and political effects of microprocessor use in Poland are covered. Also discussed are the use of terminals in accounting, laser use in nuclear fusion, cooperation in semiconductor research, the importance of biotechnology, the monitoring and disposal of radioactive waste, and crop protection with pesticides. For individual titles, see N84-34964 through N84-34966.

N84-34964# Joint Publications Research Service, Arlington, Va.
TRENDS IN MICROPROCESSOR TECHNOLOGY OUTLINED
M. Pardon *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-027) 26 Jul. 1984 p 10-14 Transl. into ENGLISH from Militaertech. (East Berlin), no. 3, 1984 p 156-157 (For primary document see N84-34963 24-60)
Avail: NTIS HC A03/MF A01

The trends examined are the following: to analyze the status achieved in the German Democratic Republic in the area of microprocessor technology; to clarify current and perspective development problems for microprocessors, circuit families system design technologies, and testing technology; to make more effective the programming and use of technical languages; to improve applications; and to formulate conclusions for manufacturers and users. Some developmental trends in various technical areas of microprocessor technology are presented. E.R.

N84-34965# Joint Publications Research Service, Arlington, Va.
NEW COMPUTER DEVELOPMENTS DESCRIBED
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-027) 26 Jul. 1984 p 23-30 Transl. into ENGLISH from Glos Wybrzeza (Poland), 18 May 1984 p 1 (For primary document see N84-34963 24-60)
Avail: NTIS HC A03/MF A01

The production of the first Polish microcomputer is discussed, along with its cost and its intended users. The approach taken in establishing an interschool computer network is presented. The goals; technical economic and organizational circumstances; and user requirements for the network are also detailed. E.R.

N84-34966# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF MICROELECTRONICS DESCRIBED c33
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-027) 26 Jul. 1984 p 31-38 Transl. into ENGLISH from Elektron. (Warsaw), no. 2, Feb. 1984 p 31-33 (For primary document see N84-34963 24-60)
Avail: NTIS HC A03/MF A01

Polish representatives from science, technologoy and other branches of industry met to discuss jointly the use of microprocessors and their effects in the social, economic and political spheres. Some conclusions reached were: the electronization of the national economy is a strategic necessity; to organize research and development activity via government programs; technological bases for electronization of industry must be created; and electronization must have the highest priority. E.R.

N84-34967# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
1 Aug. 1984 42 p Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-028) Avail: NTIS HC A03/MF A01

Various topics related to computer aided manufacturing are discussed. The K1520 microcomputer, a survey of microcomputers manufactured in socialist countries, the utilization of robots, and social factors involved in automated manufacturing are among the topics discussed. For individual titles, see N84-34968 through N84-34972.

N84-34968# Joint Publications Research Service, Arlington, Va.
ROBOTRON K 1520 MICROCOMPUTER
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-028) 1 Aug. 1984 p 1-7 Transl. into ENGLISH from Szamitastech. (Budapest), Sep. 1983 p 4-5 (For primary document see N84-34967 24-60)
Avail: NTIS HC A03/MF A01

A general discussion of computer aided manufacturing with

emphasis upon the use of microcomputers is given. The chief advantages of the K 1520 microcomputer system are listed. System development, hardware, software, and applications are discussed. R.J.F.

N84-34969# Joint Publications Research Service, Arlington, Va.
MICROCOMPUTERS OF SOCIALIST COUNTRIES
Peter Broczdo *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-028) 1 Aug. 1984 p 8-12 Transl. into ENGLISH from Szamitastech. (Budapest), Sep. 1983 p 5 (For primary document see N84-34967 24-60)
Avail: NTIS HC A03/MF A01

A survey of microcomputers manufactured in socialist countries is given. Marketing forces and their impact on microcomputer and software supply and development are discussed. R.J.F.

N84-34970# Joint Publications Research Service, Arlington, Va.
COMPUTERS, MICROPROCESSORS, ECONOMY OF USSR
Vladimir Myasnyikov *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-028) 1 Aug. 1984 p 13-17 Transl. into ENGLISH from Szamitastech. (Budapest), Sep. 1983 p 8 (For primary document see N84-34967 24-60)
Avail: NTIS HC A03/MF A01

The use of microcomputers in manufacturing is discussed. Productivity increases, the development of microprocessor and integrated circuit technology, and standardization are discussed. R.J.F.

N84-34971# Joint Publications Research Service, Arlington, Va.
INITIAL STEPS IN UTILIZATION OF ROBOTS
Katalin Bossanyi *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-028) 1 Aug. 1984 p 28-30 Transl. into ENGLISH from Nepszabadsag (Budapest), 26 May 1984 p 5 (For primary document see N84-34967 24-60)
Avail: NTIS HC A03/MF A01

The robot and manipulator exhibits at Hungarian trade fair are discussed. A lathe, the manufacturing of hot plant service robots, the manufacturing of watch parts, and the manufacturing of agricultural machinery are discussed. R.J.F.

N84-34972# Joint Publications Research Service, Arlington, Va.
ACADEMICIAN VAMOS INTERVIEWED ON AUTOMATION RELATED PROBLEMS **c63**
Judit Kozma *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-028) 1 Aug. 1984 p 31-36 Transl. into ENGLISH from Nepszabadsag (Budapest), 30 Jun. 1984 p 5 (For primary document see N84-34967 24-60)
Avail: NTIS HC A03/MF A01

The development of automated industrial techniques in Hungary is discussed. Social factors, international cooperation, industrial leadership, the role of the engineer, and conditions that should influence technical development are discussed. R.J.F.

N84-35072# Joint Publications Research Service, Arlington, Va.
SELECTIONS ON COMPUTER TECHNOLOGY IN CSSR: COMPUTERS YESTERDAY AND TODAY
M Okrouhlik *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 1-12 refs Transl. into ENGLISH from Sdelovaci Tech. (Prague), no. 3, 1984 p 86-89 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

N84-35073# Joint Publications Research Service, Arlington, Va.
MONOLITHIC 8-BIT CONVERTER
Jiri Jilek *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 12-23 refs Transl. into ENGLISH from Sdelovici Tech. (Prague), no. 3, 1984 p 93-95 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

N84-35074# Joint Publications Research Service, Arlington, Va.
MICROCOMPUTER-AIDED A/D CONVERTERS
Peter Mifkovic *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 23-26 ref Transl. into ENGLISH from Sdelovaci Tech. (Prague), no. 3, 1984 p 97-98 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

N84-35075# Joint Publications Research Service, Arlington, Va.
EC 1027 COMPUTER SYSTEM
Josef Cmiral *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 34-38 Transl. into ENGLISH from Vyber Informaci (Prague), no. 2, 1984 p 197-199 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

N84-35079# Joint Publications Research Service, Arlington, Va.
CEMA COMPUTER HARDWARE COOPERATION
Krzysztof Urbaniec *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 9-12 Transl. into ENGLISH from Informatyka (Warsaw), no. 3, Mar. 1984 p 26 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

N84-35080# Joint Publications Research Service, Arlington, Va.
R-35 COMPUTER SHORTCOMINGS
Teresa Wilczec *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 13-15 Transl. into ENGLISH from Informatyka (Warsaw), no. 4, Apr. 1984 p 26-27 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

N84-35081# Joint Publications Research Service, Arlington, Va.
SOCIALIST COUNTRIES COOPERATE IN COMPUTER R AND D
Krum Lazarov *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 17-20 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 67-69 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N84-34973*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RECOZ DATA REDUCTION AND ANALYSIS: PROGRAMS AND PROCEDURES
Edith I. Reed 19 Jan. 1984 317 p
(NASA-TM-87365; X-616-84-21; NAS 1.15:87365) Avail: NTIS HC A14/MF A01 CSCL 09B

The RECOZ data reduction programs transform data from the RECOZ photometer to ozone number density and overburden as a function of altitude. Required auxiliary data are the altitude profile versus time and for appropriate corrections to the ozone cross sections and scattering effects, air pressure and temperature profiles. Air temperature and density profiles may also be used to transform the ozone density versus geometric altitude to other units, such as to ozone partial pressure or mixing ratio versus pressure altitude. There are seven programs used to accomplish this: RADAR, LISTRAD, RAW OZONE, EDIT OZONE, MERGE, SMOOTH, and PROFILE. S.B.

N84-34974*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERACTIVE DIGITAL SIGNAL PROCESSOR
William H. Mish, Ray M. Wenger (Computer Science Corp., Silver Spring, Md.), Kenneth W. Behannon, and James B. Byrnes Sep. 1982 167 p refs
(NASA-TM-83997; NAS 1.15:83997) Avail: NTIS HC A08/MF A01 CSCL 09B

The Interactive Digital Signal Processor (IDSP) is examined. It consists of a set of time series analysis Operators each of which

operates on an input file to produce an output file. The operators can be executed in any order that makes sense and recursively, if desired. The operators are the various algorithms used in digital time series analysis work. User written operators can be easily interfaced to the sysatem. The system can be operated both interactively and in batch mode. In IDSP a file can consist of up to n (currently n=8) simultaneous time series. IDSP currently includes over thirty standard operators that range from Fourier transform operations, design and application of digital filters, eigenvalue analysis, to operators that provide graphical output, allow batch operation, editing and display information. M.A.C.

N84-34975*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PILOT CLIMATE DATA SYSTEM: USER'S GUIDE FOR CHARTS SUBSYSTEM
Carey E. Noll Sep. 1984 106 p refs
(NASA-TM-86151; NAS 1.15:86151) Avail: NTIS HC A06/MF A01 CSCL 09B

The use of the Pilot Climate Data System's (PCDS) CHARTS Subsystem is described. This facility is an interactive software system for the graphical production and enhancement of text and viewgraph displays. M.A.C.

N84-34976*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REAL-TIME SOLAR MAGNETOGRAPH OPERATION SYSTEM SOFTWARE DESIGN AND USER'S GUIDE
Caroline Wang Sep. 1984 141 p refs
(NASA-TM-86467; NAS 1.15:86467) Avail: NTIS HC A07/MF A01 CSCL 09B

The Real Time Solar Magnetograph (RTSM) Operation system software design on PDP11/23+ is presented along with the User's Guide. The RTSM operation software is for real time instrumentation control, data collection and data management. The data is used for vector analysis, plotting or graphics display. The processed data is then easily compared with solar data from other sources, such as the Solar Maximum Mission (SMM). Author

N84-34977*# Illinois Inst. of Tech., Chicago. Dept. of Electrical and Computer Engineering.
UNDETECTED ERROR PROBABILITY AND THROUGHPUT ANALYSIS OF A CONCATENATED CODING SCHEME Interim Report
Daniel J. Costello 15 Oct. 1984 11 p refs
(Grant NAG5-234)
(NASA-CR-173983; NAS 1.26:173983) Avail: NTIS HC A02/MF A01 CSCL 09B

The performance of a proposed concatenated coding scheme for error control on a NASA telecommand system is analyzed. In this scheme, the inner code is a distance-4 Hamming code used for both error correction and error detection. The outer code is a shortened distance-4 Hamming code used only for error detection. Interleaving is assumed between the inner and outer codes. A retransmission is requested if either the inner or outer code detects the presence of errors. Both the undetected error probability and the throughput of the system are analyzed. Results indicate that high throughputs and extremely low undetected error probabilities are achievable using this scheme. Author

N84-34978# Softech, Inc., Waltham, Mass.
US ARMY ADA TRAINING CURRICULUM. CURRICULUM CATALOG, 1984
1984 40 p
(Contract DAAB07-83-C-K514)
(AD-A144188) Avail: NTIS HC A03/MF A01 CSCL 05/9

The Ada Training Curriculum defines a comprehensive set of training course modules or building blocks which can be connected in a variety of ways and coupled with workbooks and supplementary materials to form training programs that satisfy a given set of needs. A complete list of the course modules is given in Table 1 (p.5) and Table 2 (p.6) lists the workbooks and supplementary materials. The course modules differ in one or more of the following dimensions. GRA

N84-34979# Army Communications Research and Development Command, Fort Monmouth, N. J.
EMBEDDED SYSTEM DESIGN WITH Ada AS THE SYSTEM DESIGN LANGUAGE
T. J. Wheeler 1984 30 p
(AD-A144232) Avail: NTIS HC A03/MF A01 CSCL 09/2

Recent research in the software engineering field has produced a number of techniques or rationals for structuring the understanding of systems. Many of these techniques are applicable to the design of embedded computer systems and produce designs whose structures are easily expressible in the Ada language. The Ada language has a structure which allows the design of systems to be expressed independently of its implementation and thus can be a good system design language for use with these techniques. This paper describes the software design problem in the development of embedded computer systems and shows how the Ada language can be used as a system design language as well as a system implementation language to alleviate these problems. The essential point of this paper is that using Ada as a system design language encourages the designer to use the recently developed techniques and theory to develop better structures for their systems and then implement the systems in the same language thus preserving that structure in the product. Author (GRA)

N84-34980# Softech, Inc., Waltham, Mass.
ADA TRAINING CURRICULUM. INTRODUCTION TO SOFTWARE ENGINEERING, M102: TEACHERS' GUIDE
May 1984 706 p
(Contract DAAB07-83-C-K514)
(AD-A144236) Avail: NTIS HC A99/MF A01 CSCL 05/9

The goals are to develop a conceptual understanding of software engineering concepts, overview understanding of software engineering methods, and establish a relationship between software engineering and Ada. Motivation and background covers why should the student be here and historical perspective. Software engineering and its goals covers a definition of software engineering - its goals and principles, quality, and in-class exercise. How these goals are achieved in the life-cycle model to develop systems, team approach to system development, and discussion. How the goals of requirements, design, structured programming, summary of techniques, testing, metrics, software development environments, and configuration management are achieved. GRA

N84-34981# Softech, Inc., Waltham, Mass.
ADA TRAINING CURRICULUM. INTRODUCTION TO SOFTWARE ENGINEERING, M102. TEACHER'S GUIDE: EXERCISES
May 1984 24 p
(Contract DAAB07-83-C-K514)
(AD-A144237) Avail: NTIS HC A02/MF A01 CSCL 05/9

The purpose of instructor's guide for the exercise is designed to illustrate the use of the engineering goals and principles that we have been discussing. The class is split into four groups: Three with specific goals stated in the exercise, a fourth with no explicit goals. Each of the three groups has a different goal as follows: (1) The user must never fail to build the object, using the documentation (reliability); (2) The user must build the object within five minutes, using the documentation (performance); (3) Once built, the user must be able to tear down and store the pieces, so the object the object can be rebuilt later (maintainability). The exercise is designed to allow the student to discover and experience the ways in which differing goals can change the resulting software. Of course, the viewgraph procedural documentation is analogous to software (i.e., Code). If a group finishes early, have them document their procedure on an additional viewgraph - they should present last. GRA

N84-34982# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. SOFTWARE

ENGINEERING METHODOLOGIES M201 TEACHER'S WORKBOOK
Jul. 1984 84 p
(Contract DAAB07-83-C-K514)
(AD-A144240; AD-E500672) Avail: NTIS HC A05/MF A01 CSCL 05/9

Each exercise has the following format: (1) Overview of the method; (2) Problem statement; (3) Solution method; (4) Syntax summary, and (5) Pages for documenting the solution. GRA

N84-34983# Rome Air Development Center, Griffiss AFB, N.Y.
LISP IMPLEMENTATION BASELINE INVESTIGATION Report, Apr. 1980 - Apr. 1984
R. C. Schrag Jun. 1984 44 p
(AD-A144244; RADC-TR-84-151) Avail: NTIS HC A03/MF A01 CSCL 09/2

LOGLISP is an Artificial Intelligence programming environment that fully combines the facilities of logic programming and LISP. This report describes the implementation of a simple knowledge-based system in LOGLISP, performed as part of an effort to evaluate the effectiveness of LOGLISP for implementing a simple knowledge-based system - in terms of programming ease, program clarity, and program efficiency - using its original LISP implementation as a baseline. For the baseline investigation the knowledge-based system MicroKnobs is used. The report includes descriptions of MicroKnobs interaction and of the software architectures of its LISP and our LOGLISP implementations, and an evaluation of our implementation and selected design alternatives against the original MicroKnobs in terms of programming ease, program clarity, and program efficiency. The results indicate the LOGLISP is a viable environment for the implementation and development of knowledge-based systems. GRA

N84-34984# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING METHODOLOGIES M201 TEACHER'S GUIDE, VOLUME 1
Jul. 1984 533 p 3 Vol.
(Contract DAAB07-83-C-K514)
(AD-A144256; AD-E401208) Avail: NTIS HC A23/MF A01 CSCL 05/9

Day 1 is concerned with: getting the course off on the right foot, providing some motivation, an introduction, and covering some methodologies applicable to the analysis phase of the system life cycle. Day 2 addresses only those methodologies concerned mostly with architectural design issues. Design quality is also covered today. GRA

N84-34985# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING METHODOLOGIES M201 TEACHER'S GUIDE, VOLUME 2
Jul. 1984 470 p 3 Vol.
(Contract DAAB07-83-C-K514)
(AD-A144257; AD-E401208) Avail: NTIS HC A20/MF A01 CSCL 05/9

Design is a blueprint of modules and their interconnections. The design process allocates the functional requirements to a design structure, presenting the form or design structure along with some indication of where the various functions are to be performed. The structure and allocation should allow the performance and analytic requirements to be factored in and verified as constraints. The interfaces between the components of the structure are also defined at this time. More emphasis is placed on these interfaces (e.g., Parnas) than others (e.g., structured design). GRA

N84-34986# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING METHODOLOGIES M201 TEACHER'S GUIDE, VOLUME 3
Jul. 1984 430 p 3 Vol.
(Contract DAAB07-83-C-K514)
(AD-A144258; AD-E401208) Avail: NTIS HC A19/MF A01 CSCL 05/9

Give some motivation by describing in general what structured programming is about and why it's useful. A few different definitions may be helpful. For example, structured programming is the art of organizing complexity, mastering multitudes, and its resulting bastard chaos as effectively as possible. Emphasize that structured programming is a methodology. Using unique control structures (and no go to's) and nesting code do not by themselves constitute structured programming. One also needs an organizational method to collectively use these techniques by everyone on a project, such as IBM's programming teams. It is language independent, but certain languages help more than others, e.g., Ada. Step-wise refinement is the key. It is not a religion (of not using go to's). It is meant to enhance readability, reliability, programmer efficiency, etc. The absence or rare occurrence of go to's is no more than a symptom of structured programming. GRA

N84-34987# Texas Univ., Austin. Inst. for Computing Science and Computer Applications.
REHOSTING THE THEOREM PROVER Annual Summary Report, 1 Jun. 1983 - 31 May 1984
R. S. Boyer and J. S. Moore 13 Jul. 1984 4 p
(Contract N00014-81-K-0634)
(AD-A144356) Avail: NTIS HC A02/MF A01 CSCL 09/2

This letter represents the annual summary report for the period June 1, 1983 to May 31, 1984. Two different research activities were pursued during this period: rehosting theorem prover onto several different computers and extending the formal logic supported by the system. Author (GRA)

N84-34988# Texas Univ., Austin. Austin Inst. for Computing Science and Computer Applications.
PROGRAM VERIFICATION
R. S. Boyer and J. S. Moore 1984 11 p
(Contract N00014-81-K-0634; Grant NSF MCS-82-02943)
(AD-A144360) Avail: NTIS HC A02/MF A01 CSCL 09/2

Computer programs may be regarded as formal mathematical objects whose properties are subject to mathematical proof. Program verification is the use of formal, mathematical techniques to debug software and software specifications. Author (GRA)

N84-34989# Rome Air Development Center, Griffiss AFB, N.Y.
LOGLISP SEQUENTIAL FORMS WITH RESOLUTION SEMANTICS In-House Report, 20 Jan. - 2 Feb. 1984
R. C. Schrag Jul. 1984 16 p
(AD-A144413; RADC-TM-84-13) Avail: NTIS HC A02/MF A01 CSCL 09/2

This memorandum describes an extension to the semantics of the LOGLISP artificial intelligence programming language that allows resolution in sequential forms. The execution cycle of LOGLISP and the resolution semantics of existing special forms are summarized, and the need for an definitions of resolution semantics for sequential forms are presented. Author (GRA)

N84-34990# Naval Postgraduate School, Monterey, Calif.
COMPUTER AIDED DATA ACQUISITION AND CONTROL OF AN INTERNAL COMBUSTION ENGINE M.S. Thesis
B. R. Oakes Mar. 1984 107 p
(AD-A144425) Avail: NTIS HC A06/MF A01 CSCL 09/2

Two microcomputers, a Digital Equipment Corporation VT-103 and an Octagon Systems Corporation SYS-1, were interfaced with a General Motors Model 1-53X3 single cylinder diesel engine to provide automated data acquisition and data reduction and engine control while running classroom experiments. Engine inlet and exhaust temperatures and pressures, RPM, torque and fuel flow along with additional engine parameters can be measured with the aid of a computer. Values for parameters such as specific fuel consumption, air-to-fuel ratio, and thermal efficiency can then be computed and both measured and computed values can be displayed and recorded. The Digital Equipment Corporation Computer is the parent computer and is used interactively for

data acquisition and data reduction and for feedback control through the Octagon computer to which it is linked. The Octagon computer is used exclusively for control of the engine speed and load. Author (GRA)

N84-34991# Softech, Inc., Waltham, Mass.
INTEGRATED COMPUTER-AIDED MANUFACTURING (ICAM) ARCHITECTURE, PART 3. VOLUME 7: MFG01 GLOSSARY Final Report, Sep. 1980 - Oct. 1982
R. Heine, R. Prewett, S. Coleman, L. Beebe, and B. Davis Wright-Patterson AFB, Ohio AFWAL Sep. 1983 235 p
(Contract F33615-80-C-5109)
(AD-A144426; AFWAL-TR-82-4063-Vol-7) Avail: NTIS HC A11/MF A01 CSCL 09/2

The Integrated Computer Aided Manufacturing (ICAM) Architecture Part 3 was initiated to maintain and update the existing manufacturing architecture as well as develop training courses to assist in the transition of IDEF applications, concepts and procedures to other Air Force programs. This volume presents all the terms from the function and information models of manufacturing. Author (GRA)

N84-34992# Stanford Univ., Calif. Dept. of Computer Science.
IMPLEMENTATION OF LOGICAL QUERY LANGUAGES FOR DATABASES
J. D. Ullman May 1984 43 p
(Grant AF-AFOSR-0212-80)
(AD-A144435; SU-STAN-CS-84-1000; AFOSR-84-0640TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

We examine methods of implementing queries about relational databases in the case that these queries are expressed in first-order logic as a collection of Horn clauses. Because queries may be defined recursively, straightforward methods of query evaluation do not always work, and a variety of strategies have been proposed to handle subsets of recursive queries. We shall express such query evaluation techniques as capture rules on a graph representing clauses and predicates. The essential property of capture rules is that they can be applied independently, thus providing a clean interface for query-evaluation systems that use several different strategies in different situations. We show how rules suggested previously can be fit into this framework, and we propose some new capture rules and generalizations of old ones. Author (GRA)

N84-34993# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. ADVANCED ADA TOPICS 1305, TEACHER'S GUIDE EXERCISES
Jul. 1984 25 p
(Contract DAAB07-83-C-K514)
(AD-A144497) Avail: NTIS HC A02/MF A01 CSCL 05/9

There are far more exercises in this booklet than can be solved during one presentation of L305. The instructors should select specific exercises for the class based on the class's mathematical background and programming ability, the pace of the course, and the degree of success solving previous exercises. The purpose of this Guide is to help instructors make this selection. Each exercise is designed for a certain point in the course. The accompanying diagram shows the point at which each exercise can be assigned. In most cases the exercise makes use of information presented as part of the indicated topic, and should be assigned after that topic has been presented. Because L305 emphasized data abstraction and the construction of software out of components, solutions to most of the exercises are packages rather than subprograms. Thus they are not executable by themselves. GRA

N84-34994# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. ADVANCED ADA TOPICS 1305, TEACHER'S GUIDE EXERCISES VOLUME 1
Jul. 1984 530 p 3 Vol.
(Contract DAAB07-83-C-K514)
(AD-A144498) Avail: NTIS HC A23/MF A01 CSCL 05/9

Some Goals of Ada: (1) Be able to write huge programs which can be understood piece-by-piece. (2) Be able to divide a programming project among teams working independently. (3) Be able to write general software components that can be incorporated in many programs. These abilities are provided by packages. Unlike a subprogram, a package does not exist in order to be executed. A package provides a collection of computational resources that may be used by one or more other program components. These resources include variables, type declarations, procedures, and functions, among others. Resources should be placed in the same package if they are closely related, and meant to be used in conjunction with each other. A package is a collection of related entities including among others: variables, type declarations, procedures, and functions. Packages are the basic building blocks of large programs. Other names for packages are modules, clusters, program components. This is a description of an Ada package providing two named numbers, three subtypes of type float, and 16 functions. The package consists of this description plus a body containing the bodies of the 16 functions. GRA

N84-34995# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. ADVANCED ADA TOPICS 1305, TEACHER'S GUIDE EXERCISES VOLUME 2
Jul. 1984 228 p 3 Vol.
(Contract DAAB07-83-C-K514)
(AD-A144499) Avail: NTIS HC A11/MF A01 CSCL 05/9

The basic idea in overloading is that an identifier can be declared to have more than meaning within a declarative region and that none of these meanings hide any of the other meanings. Usually, the context of a particular use of an overloaded identifier determines which meaning is applicable. However, qualification can be used to force a particular meaning to apply to a given use of an overloaded identifier. Overloading is allowed for identifiers that are declared as enumeration literals or as subprograms (or entries). These examples illustrate why overloading of enumeration literals is desirable. For example, in the real world, orange is a color, a fruit, and a flavor, and these facts are directly and mnemonically expressible in the Ada code. This is a small artificial example for clarity designed to illustrate rules rather than typical uses of overloading. GRA

N84-34996# Softech, Inc., Waltham, Mass.
ADA TRAINING CURRICULUM. ADVANCED ADA TOPICS L305 TEACHER'S GUIDE EXERCISES, VOLUME 3
Jul. 1984 529 p
(Contract DAAB07-83-C-K514)
(AD-A144500) Avail: NTIS HC A23/MF A01 CSCL 05/9

Deallocation of allocated variables include (1) The storage available for allocated variables is finite; (2) Evaluation of an allocator when no storage is left raises the predefined exception storage error; 3) Ada provides a means for deallocating a variable - that is, recycling its storage so that the storage may be re-used. GRA

N84-34997# Naval Biodynamics Lab., New Orleans, La.
A METHOD OF PHOTO DATA REDUCTION, WITH DESIGN CONSIDERATIONS FOR THE NOVA 800 AND UNIVAC 1100/83 COMPUTERS
J. J. Lambert Jan. 1984 88 p
(AD-A144537; NBDL-84R001) Avail: NTIS HC A05/MF A01 CSCL 09/2

Digitized photo data acquired during impact experiments must be scaled and converted to a format suitable for analysis. Once converted, this data requires comprehensive graphical presentation for efficient interpretation. This report presents a detailed description of the software developed to accomplish such tasks in both a production and an interactive environment. Procedures utilizing the design presented have been instituted at NBDL and found to be effective. Author (GRA)

N84-34998# VSE Corp., Camarillo, Calif.
A GUIDE TO THE ELECTRICAL ANALYSIS SOFTWARE SYSTEM

(EASS) Final Report, Oct. 1983 - Apr. 1984
S. DEMonsebert Jun. 1984 61 p
(Contract N00123-82-D-0149; Z08-29)
(AD-A144680; NCEL-CR-84.027) Avail: NTIS HC A04/MF A01 CSCL 09/2

The Electrical Analysis Software System (EASS) was developed to statistically analyze Naval activity electrical consumption. The software utilizes two data sources, the Facilities Systems Office Naval Facility Assets/Master Activity General Information and Control data base and the Defense Energy Information System II data base. The commercial statistical regression package called Biomedical Computer Programs is used in conjunction with EASS. The FORTRAN source code is included in the text. GRA

N84-34999# LTV Aerospace Corp., Dallas, Tex. Vought Aero Products Div.
ICAM (INTEGRATED COMPUTER AIDED MANUFACTURING) CONCEPTUAL DESIGN FOR COMPUTER-INTEGRATED MANUFACTURING. VOLUME 4, PART 5, TASK D: QUALITY ASSURANCE/QUALITY, CONTROL/TECHNICAL REQUIREMENT/TASKS, QUALITY ASSURANCE MODELING AND ANALYSIS, ARCHITECTURE FOR PRODUCT ASSURANCE, (TTD) Final Technical Report, 1 Oct. 1981 - 29 Jun. 1984
D. L. Norwood, R. H. Wettach, B. R. Shepherd, W. D. Vinson, and R. R. Preston Jun. 1984 102 p
(Contract F33615-81-C-5119)
(AD-A144691; Rept-2-20150/4R-2; TTD110513000; AFWAL-TR-84-4020-Vol-4) Avail: NTIS HC A06/MF A01 CSCL 13/8

This document, Volume 4, Part 5 of the Final Technical Report contain the QA Architecture for Product Assurance Document. This document presents the models and architecture of the QA AS-IS system. It is a technology transfer oriented report that simplifies the modernization process considerably by providing a logical process to sequence improvement events, prioritize those operations that merit immediate attention, eliminate replications of procedures, and establish a pattern or road map that is designed to be a pertinent while at the same time flexible enough to adapt to any given situation. GRA

N84-34475*# Martin Marietta Aerospace, Denver, Colo.
STANDARDIZATION IN SOFTWARE CONVERSION OF (ROM) ESTIMATING
Glen H. Rost *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 72-76 (For primary document see N84-34466 24-18)
Avail: NTIS HC A13/MF A01 CSCL 09B

N84-34940# Department of Energy, Washington, D. C.
A TECHNIQUE TO APPROXIMATE COMPLEX COMPUTER MODELS: AN APPROXIMATION OF THE TEISBERG MODEL
J. M. Teesmer *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 307-327 (For primary document see N84-34927 24-59)
(AD-P003855) Avail: NTIS HC A17/MF A01 CSCL 09/2

N84-34952# Joint Publications Research Service, Arlington, Va.
SOFTWARE DEBUGGING DEVICES FOR MICROPROCESSORS
P. P. Sypchuk, A. D. Ivannikov, and I. D. Kurilovskiy *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 62-72 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Priborostr. (Leningrad), no. 9, Sep. 1983 p 53-61 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

N84-34956# Joint Publications Research Service, Arlington, Va.
IMPROVING AUTOMATED STATISTICAL DATA PROCESSING
Valeriy Nazarov *In its* USSR Rept.: Cybernetics, Computers and Autom. Technol. (JPRS-UCC-84-001) 23 Feb. 1984 p 111-116 Transl. into ENGLISH from Ekon. Sotrudnichestvo Stran-Chlenov SEV (Moscow), no. 7, Jul. 1983 p 67-69 (For primary document see N84-34942 24-60)
Copyright. Avail: NTIS HC A07

N84-35068# National Chiao Tung Univ., Hsinchu (Taiwan).
A COMPUTER PROGRAM DESIGNED FOR CONTOUR CHART PLOTTING Abstract Only
Kang Cheng *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 516 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

62 COMPUTER SYSTEMS

Includes computer networks.

N84-34961# Joint Publications Research Service, Arlington, Va.
DELTA COMPUTER NETWORK TO BE EXPANDED
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-033) 28 Aug. 1984 p 1-42 refs Transl. into ENGLISH from Rechentech. -Datenverarbeitung (East Berlin), v. 21, no. 5, May 1984 p 5-7 (For primary document see N84-34960 24-60)
Avail: NTIS HC A04/MF A01

N84-35065# National Taing Hua Univ., Hsinchu (Taiwan).
LARGE SCALE SOFTWARE DEVELOPMENT PROJECT ON THE DESIGN OF A COMPUTER NETWORK SYSTEM Abstract Only
Chia-Tung Lee, Wen-Tsuen Chen, and Hsiao-Chuan Wang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 511-512 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35078# Joint Publications Research Service, Arlington, Va.
CEMA COMPUTER COOPERATION, PROBLEMS DESCRIBED; APPLICATION OF BRITISH TECHNOLOGY
Jozef F. Lewoc *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 1-9 refs Transl. into ENGLISH from Informatyka (Warsaw), no. 3, Mar. 1984 p 5-8 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N84-35000# Naval Postgraduate School, Monterey, Calif.
INTERACTIVE IMPLEMENTATION OF THE OPTIMAL SYSTEMS CONTROL DESIGN PROGRAM (OPTSYSX) ON THE IBM 3033 M.S. Thesis
J. G. Hoden, II Mar. 1984 146 p
(AD-A144159) Avail: NTIS HC A07/MF A01 CSCL 09/2

This thesis discusses the modification of an existing Optimal Systems Control FORTRAN program (OPTSYS) originally obtained from Professor Arthur E. Bryson of Stanford University. The modified FORTRAN IV program (OPTSYSX) is now designed to run completely interactively under VM/CMS on the IBM 3033 and is considered completely compatible with similar operating systems. Program capabilities include: complete eigensystem analysis; the ability to perform computations on very large multi-variable systems; controller, filter, regulator and compensator synthesis; transfer function analysis; steady-state gain determinations; and modal analysis. The program permits users to rapidly carry out simulation, analysis, and design of all classes of optimal systems control problems in a totally interactive mode. Examples of various types of problems are worked out during individual terminal sessions. An OPTSYSX program listing is provided in the appendix. GRA

N84-35001*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision.
ADAPTIVE CONTROL WITH VARIABLE DEAD-ZONE NON-

LINEARITIES
D. Orlicki, L. Valavani, M. Athans, and G. Stein Mar. 1984 6 p (Grant NGL-22-009-124; Contract N00014-82-K-0582; Grant NSF ECS-82-10960)
(NASA-CR-173980; NAS 1.26:173980; AD-A144387; LIDS-P-1382) Avail: NTIS HC A02/MF A01 CSCL 12A

It has been found that fixed error dead-zones is defined in the existing literature result in serious degradation of performance, due to the conservativeness which characterizes the determination of their width. In this paper, variable width dead-zones are derived for the adaptive control of plants with unmolded dynamics. The derivation makes use of information available about the unmolded dynamics both a priori as well as during the adaptation process, so as to stabilize the adaptive loop and at the same time overcome the conservativeness and performance limitations of fixed-dead zone adaptive or fixed gain controllers. Author (GRA)

N84-35002# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INVESTIGATION OF MULTIPLE CONTROLLER SYSTEM EFFICIENCY AS APPLIED TO THE CSDLI MODEL M.S. Thesis
R. G. Baker Mar. 1984 86 p
(AD-A144597; AFIT/GA/AA/84M-2) Avail: NTIS HC A05/MF A01 CSCL 12/1

Modern optimal control methods are used to develop a three controller system. The control problem is formulated in state vector form using full state feedback, The control is implemented on a modal representation of the structural equations of motion. State estimates are provided by a deterministic observer. A computer model is used to generate controller and estimator gains using steady state optimal regulator theory. Means for extracting structural response and control effort time histories are developed and related to the computer model. The three controller system is used to control the model subjected to physical initial conditions. The model is a lumped mass tetrahedral truss consisting of four unit massed that are pin-connected by massless rods. Two versions of the model are used: The nominal version as designed by the Draper Lab and a perturbed version designed to minimize the deflection due to a static load. Four structure/controller configurations are tested via computer simulations. Compatibility of modal groupings and the use or non-use of system triangularization are the factors varied to form the controller configurations. All configurations use three controllers each controlling four of the twelve modes. Modal input to the program is supplied by a NASTRAN analysis of each structure. Time histories of structural response and expended control effort are computed for each test configuration using a series of structural response weightings to vary the control and estimator gains. Performance curves are formed for each configuration to allow comparison of system efficiencies. The effect of the separate combination of modal compatibility and use or non-use of system triangularization on system efficiency is examined. GRA

N84-35003# Pittsburgh Univ., Pa. Learning Research and Development Center.
SPIRIT: AN EVOLUTIONALLY DESIGNED INTELLIGENT TUTORING SYSTEM
H. E. Pople, Jr. Jul. 1984 44 p
(Contract N00014-82-K-0613; RR0-4206)
(AD-A144638; UPITT/LRDC/ONR/APS-15) Avail: NTIS HC A03/MF A01 CSCL 09/2

SPIRIT is an Intelligent Tutoring System for tutoring probability theory which has evolved through a continuous process of experimentation and tuning. The system manages a unique flexible tutoring style. On one hand, the system may behave as a tutor who mostly observes the student without interference, intervening only when things are really going wrong and on the other hand, it may behave as a tutor who manages a questioning and answering type of dialogue. Based on a belief constructed about the student's aptitude, the system frequently changes its tutoring style. SPIRIT integrates several artificial intelligence methods that include: a theorem prover; a production system; an object oriented system and procedural knowledge embedded in LISP code. Author (GRA)

N84-34972# Joint Publications Research Service, Arlington, Va.
ACADEMICIAN VAMOS INTERVIEWED ON AUTOMATION RELATED PROBLEMS
Judit Kozma *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-028) 1 Aug. 1984 p 31-36 Transl. into ENGLISH from Napszabadsag (Budapest), 30 Jun. 1984 p 5 (For primary document see N84-34967 24-60)
Avail: NTIS HC A03/MF A01

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N84-35004# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ON PARAMETER IDENTIFICATION AND STATE ESTIMATION FOR DISTRIBUTED PARAMETER SYSTEMS
J. A. M. Felippe deSouza Aug. 1984 6 p refs Presented at the 1st Conf. on Telecommun. and Control, Halkidiki, Greece, 27-30 Aug. 1984
(INPE-3236-PRE/585) Avail: NTIS HC A02/MF A01

Some results associated with semilinear distributed parameter systems on a state space Z, with some parameters systems on a state space Z, with some parameters (alpha is an element of R(p)) to be identified, are presented. Some techniques have been developed to solve the joint problem of state and parameter estimation which is to construct the state z(t), is an element of [0,T] and identify the parameter (alpha is an element of R(p)) when the output observation y(t) on [0,T] is given. These techniques consider a new formulation with an enlarged state bar-z(t) = (z(t), alpha) on a new state space bar-Z = Z X R(p) and make some observability assumptions (such as overall observability) on the linearized model. However, conditions for these assumptions to hold have never been presented before. Some necessary conditions for overall observability are developed. M.G.

N84-35005# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A FEW NECESSARY CONSIDERATIONS FOR THE USE OF THE FINITE ELEMENT METHODS BY NON-SPECIALISTS
Carlos Jose Zamlutti Aug. 1984 34 p refs Submitted for publication
(INPE-3238-PRE/586) Avail: NTIS HC A03/MF A01

The grounds of the finite element methods are presented with emphasis on their use. It is suggested that the variational method can be interpreted as a way of determining an interpolatory approximation for the solution of the problem. Conversely, a weighted residuals method may be considered as a tool to perform a curve fitting of the approximation to the actual solution. The presentation follows an approach focusing the numerical quality, of the expected results, in equations involving differences (e.g., differential equations). Formulation of the differential problem in integral terms, based on the calculus of variations, or on optimization principles, is presented. The problem reduces to determining the coefficients. Variational methods are based on the minimization of an integral. The Rayleigh-Ritz method is based on the assumption that relationship can be established between the differential equation of the problem and a Euler-Lagrange differential equation. The method of weighted residuals is presented. The linear and nonlinear cases are looked at. Other applications of the finite element method are given. S.B.

N84-35006# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
REPRESENTATION OF THE FOKKER-PLANK COLLISION TERM FOR COULOMB INTERACTION AS SERIES OF LEGENDRE POLYNOMIALS
Antonio Carlos deAlmeida Ferreira Aug. 1984 28 p refs Submitted for publication
(INPE-3232-PRE/582) Avail: NTIS HC A03/MF A01

For problems with azimuthal symmetry in velocity space, the distribution function depends only on the speed and on the pitch angle.The angular dependence of the distribution function is expanded in Legendre polynomials, and the expansions of the collision integrals describing two-body Coulomb interactions in a plasma are determined through the use of the Rosenbluth potentials. The electron distribution function is written as a Maxwellian plus a deviation, nd the representation in Legendre polynomials of the electron-electron collision term is given for both its linear and nonlinear part. To determine the representation of the electron-ion collision term it is assumed that the ion distribution is much narrower in velocity space than the electron distribution, and shifted from the origin by a flow velocity. The equations are presented in a form that is suitable for their use in a computer.
Author

N84-35007# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A NOTE ON THE EIGENVALUES OF A LAYERED SYSTEM
Alejandro Livio Camerlengo Sep. 1984 10 p refs
(INPE-3263-PRE/594) Avail: NTIS HC A02/MF A01

It has been observed in oceanic modelling that numerical instability is caused when the density jump between layers is constant. This instability is usually overcome by using variable density jumps, according to McNider and O'Brien. In decomposing the vertical modes of the linearized model equation, it is shown that the eigenvectors of the layered system may introduce an anomalous fast mode if the parameters are not adequately chosen.
Author

N84-35008# University of Technology, Leicester (England). Dept. of Mathematics.
MULTI-LENGTH ARITHMETIC IMPLEMENTATION AND USES
G. A. Evans Jun. 1984 16 p refs
(MR-179) Avail: NTIS HC A02/MF A01

The development, practical uses, and implementation of multilength arithmetic is discussed. Topics include arithmetic modeling, base arithmetic procedures, main arithmetic operators, input/output routines, and transcendental functions.
M.A.C.

N84-35009*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ENTHALPY DAMPING FOR THE STEADY EULER EQUATIONS
Dennis C. Jespersen Oct. 1984 18 p refs
(NASA-TM-86008; A-9855; NAS 1.15:86008) Avail: NTIS HC A02/MF A01 CSCL 12A

For inviscid steady flow problems where the enthalpy is constant at steady state, it was previously proposed to use the difference between the local enthalpy and the steady state enthalpy as a driving term to accelerate convergence of iterative schemes. This idea is analyzed, both on the level of the partial differential equation and on the level of a particular finite difference scheme. It is shown that for the two-dimensional unsteady Euler equations, a hyperbolic system with eigenvalues on the imaginary axis, there is no enthalpy damping strategy which moves all the eigenvalues into the open left half plane. For the numerical scheme, however, the analysis shows and examples verify that enthalpy damping is potentially effective in accelerating convergence to steady state.
Author

N84-35010# Department of Energy, Washington, D. C. Office of Basic Energy Science.
SUMMARIES OF THE FY 1983 APPLIED MATHEMATICAL SCIENCES RESEARCH PROGRAM
Dec. 1983 82 p
(DOE/ER-0157/1) Avail: NTIS HC A05/MF A01

An overview of projects concerning Applied Mathematical Science funded by the Department of Energy (DOE) is presented. Emphasis is placed upon research basic to the analysis, development and use of large scale computational models and the management of complex collections of information. The Applied Mathematical Science research program is divided into four categories: analytical and numerical methods; information analysis techniques; advanced computer concepts; and special projects. Included in these areas are applied analysis research, computational mathematics, numerical methods for partial differential equations, data management, and software engineering. Also included is a listing of universities/laboratories receiving funds, and descriptions of their various projects.
S.B.

N84-35011# La Jolla Inst., Calif. Center for the Study of Nonlinear Dynamics.
THE ANALYTIC STRUCTURE OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATION Final Report, 1 Mar. 1983 - 28 Feb. 1984
J. Weiss May 1984 12 p
(Grant AF-AFOSR-0095-83)
(AD-A144121; LJI-R-84-281; AFOSR-84-0599TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Contents: The Sine-Gordon Equations; On Classes of Integrable Systems and the Painleve Property; The Painleve Property and Backlund Transformations for the Sequence of Bousinesq Equations; and Backlund Transformation and Linearizations of the Henon-Heiles System.
GRA

N84-35012# California Univ., Los Angeles. Dept. of Mathematics.
SPLINE AND WEIGHTED RANDOM DIRECTIONS METHOD FOR NONLINEAR OPTIMIZATION
J. Milstein 1984 15 p
(Grant AF-AFOSR-0243-80)
(AD-A144217; AFOSR-84-0592TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This article considers the problem of determining the optimal value and corresponding optimal point of a real function F in M variables. Only function values are given and the computation of derivatives is either not practical or are not available. Bremermann introduced an ingeneous and useful optimization algorithm that is guaranteed to converge for polynomials in several variables up to fourth degree. The heart of this method is the use of random directions of search together with a Lagrangian interpolation scheme. This author, having had extensive experience with this algorithm, found that the method has fast convergence at the early stages and tends to stagnate in the neighborhood of the optimal point. Motivated by the usefulness of random directions it is the purpose of this article to present an algorithm based on the proper use of interpolation schemes; (1) Lagrangian interpolations (such as those in Bremermann's methods); (2) spline approximations with variable nodes; (3) pseudo Newton steps using the spline derivatives (not the function); together with a search procedure along weighted random directions. The directions are chosen to be orthogonal using the Gram Schmidt orthogonalization procedure. This algorithm was extensively used for problem solving in mathematical biology, chemical kinetics, and general dynamical systems.
GRA

N84-35013# New Mexico Univ., Albuquerque. Dept. of Mathematics and Statistics.
MINIGRANT PROGRAM. A DIFFERENTIAL GEOMETRIC APPROACH TO ELECTROMAGNETIC LENS DESIGN Final Report, 16 May 1983 - 15 May 1984
A. P. Stone Jun. 1984 5 p
(Grant AF-AFOSR-0040-83)
(AD-A144239; NOTE-282; AFOSR-84-0596TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The problems investigated under this minigrant arose in the author's research on electromagnetic (EM) lens design. This research was concerned with an EM lens design technique developed by C.E. Baum for transitioning TEM waves between cylindrical and conical transmission lines.
GRA

N84-35014# Rhode Island Univ., Kingston. Dept. of Electrical Engineering.
ON THE ESTIMATION OF THE 1ST-ORDER AUTOREGRESSIVE PARAMETER Report, Apr. 1983 - Jun. 1984
F. Giannella and D. W. Tufts Jun. 1984 79 p

(Contract N00014-81-K-0144)
(AD-A144284) Avail: NTIS HC A05/MF A01 CSCL 12/1

This paper presents Cramer-Rao (C-R) bounds for parameter estimation of a first-order autoregressive process from a finite record of data. The authors used these bounds to evaluate the performance of Maximum Likelihood Estimation (MLE) and linear prediction approaches. Some estimators use low-rank approximation of an estimated covariance matrix. The latter estimates are based on the method of Tufts and Kumaresan. In this document a zero selection techniques in the last step of the procedure was added. The low-rank, high order, linear prediction estimator performs better than the other methods which were tested, when the pole is close to the unit circle. It is slightly biased and its variance is small and close to the variance given by the C-R bound for unbiased estimators. For a small number of samples (25 to 100) this estimator performs substantially better than the MLE. Author (GRA)

N84-35015# Texas Univ., Austin. Center for Cybernetic Studies.
ORDERED INCIDENCE GEOMETRY AND THE GEOMETRIC FOUNDATIONS OF CONVEXITY THEORY
A. Ben-Tal and A. Ben-Israel Mar. 1984 61 p
(Contracts N00014-82-K-0295; MDA903-81-C-0365; Grant NSF ECS-82-14081)
(AD-A144286; CCS-RR-486) Avail: NTIS HC A04/MF A01 CSCL 12/1

An Ordered Incidence Geometry, that is a geometry with certain axioms of incidence and order is proposed as a minimal setting for the fundamental convexity theorems, such as the hyperplane separation theorem and the theorems of Radon and Helly. These theorems are usually stated, proved, understood and/or applied in the context of a linear vector space, but they require only incidence and order, (and for separation, completeness), and none of the linear structure of a vector space. GRA

N84-35016# Texas Univ., Austin. Inst. for Computing Science and Computer Applications.
A COMPUTATIONAL LOGIC WITH QUANTIFIERS
R. S. Boyer and J. S. Moore Jul. 1984 42 p
(Contract N00014-81-K-0634; Grant NSF MCS-82-02943)
(AD-A144335) Avail: NTIS HC A03/MF A01 CSCL 12/1

A logical theory consists of a language, some axioms schemas, and some rules of inference. However, in developing the proofs of interesting theorems it is often necessary to introduce axioms defining new concepts and operations. Logically speaking, the main results and all of the lemmas along the way are proved in the final theory. To accomodate the practical view of the situation we provide several extension principles by which the user of the theory can add new axioms of a particularly constructive sort. Among these principles is the shell principle, which permits the axiomatization of a new type of inductively constructed object, and the definitional principle, which permits the introduction of an equation defining a recursive function. These extension principles can be considered as rules of inference since they permit one to deduce that certain formulas are theorems. We present the formal syntax of our logic. This syntax is extremely simple and is not the syntax implemented in the theorem-prover. We then develop a large number of syntactic conventions used to describe the axioms and rules of inference. Once we have completed the formal development of the logic we turn, in Section IMPLEMENTED SYNTAX, to a description of the implemented syntax. GRA

N84-35017# Stanford Univ., Calif. Information Systems Lab.
SPATIO-TEMPORAL SPECTRAL ANALYSIS BY EIGENSTRUCTURE METHODS
M. Wax, T. J. Shan, and T. Kailath 1984 43 p
(Grant AF-AFOSR-0228-83)
(AD-A144361; AFOSR-84-0487TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper presents new algorithms for estimating the spatio-temporal spectrum of the signals received by a passive array. The algorithms are based on the eigenstructure of the covariance and spectral-density matrices of the received signals. These allow partial correlation between the sources and thus are applicable to certain kinds of multipath problems. Simulation results that illustrate the performance of the new algorithms are presented. Author (GRA)

N84-35018# Institut fuer Informatik, Zurich (Switzerland).
ALGORITHMS AND FILE STRUCTURES FOR COMPUTATIONAL GEOMETRY Quarterly Progress Report
J. Nievergelt Dec. 1982 18 p
(Contract DAJA37-82-C-0058)
(AD-A144381; QPR-3) Avail: NTIS HC A02/MF A01 CSCL 12/1

Algorithms for solving geometric problems and file structures for storing large amounts of geometric data are of increasing importance in computer graphics and computer-aided design. As examples of recent progress in computational geometry, the authors explain plane-sweep algorithms, which solve various topological and geometric problems efficiently; and we present the grid file, an adaptable, symmetric multi-key file structure that provides efficient access to multi-dimensional data along any space dimension. Author (GRA)

N84-35019# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
A SYSTOLIC ALGORITHM FOR INTEGER GCD COMPUTATION
R. P. Brent (Australian National Univ., Canberra) and H. T. Kung Apr. 1984 35 p revised
(Contract N00014-80-C-0236)
(AD-A144409; CMU-CS-84-135-Rev) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this document the authors show that the greatest common divisor of two n-bit integers (given in the usual binary representation) can be computed in time O(n) on a linear array of O(n) identical systolic cells, each of which is a finite-state machine with connections to its nearest neighbors. Author (GRA)

N84-35020# Mitre Corp., McLean, Va.
THE GAIN-SPREAD-EXCITATION THEOREM
N. Kroll and M. Rosenbluth May 1984 52 p
(Contract F19628-84-C-0001; DARPA Order 4947)
(AD-A144447; JSR-82-110) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper proposed an extension of the Madey gain-spread theorem to two-dimensional wigglers and shown it to be quite generally valid. It has the important consequence that an Free Electron Laser(FEL) wiggler which yields gain must at the same time generate either energy spread or transverse excitation. Furthermore it was found that in an FEL operating quasilinearly in a storage ring, that laser gain guarantees the production of entropy with every pass through the wiggler. Consequently the laser radiation generated is restricted to be some small fraction of the synchrotron radiation and our analysis suggests that this fraction is of the order of the fractional energy aperture. This leads us to the conclusion that the achievement of high efficiency steady stage storage ring operation in a quasi-linear regime is not possible. Nonetheless, it appears that gain expanded wigglers may have superior linear gain as compared with conventional wigglers and thus prove to be useful for application in storage rings with large fractional energy aperture. GRA

N84-35021# Wisconsin Univ., Madison. Dept. of Computer Sciences.
A STUDY OF SOME MULTI-GRID IDEAS
D. Kamowitz and S. V. Parter Jun. 1984 48 p
(Grant AF-AFOSR-0275-82)
(AD-A144465; CSTR-545; AFOSR-84-0637TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

In an effort to understand certain ideas and concepts associated with multi-grid iterations the authors give an in-depth study of a particular simple problem. They consider a standard finite-

difference system associated with a two-point boundary value problem. -(pu' + bu' + qu = O, u(O) =u(1) =O. The operators Ih2h, Ih2h are operator based interpolation and projection operators while the smoothers are the damped Jacobi iterations with parameter a > O. This document determines the exact rates of convergence for the two-grid scheme and upper bounds for the multi-grid schemes. Experimental results are discussed.
Author (GRA)

N84-35022# Wisconsin Univ., Madison. Dept. of Computer Sciences.
ITERATIVE METHODS FOR ELLIPTIC PROBLEMS AND THE DISCOVERY OF Q
S. V. Parter Jul. 1984 48 p
(Grant AF-AFOSR-0275-82)
(AD-A144483; CSTR-548; AFOSR-84-0638TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document considers a direct iterative method for solving the linear system AU = Y which arises from the discretization of a boundary value problem involving an elliptic partial differential operator L of order 2m. GRA

N84-35023# Massachusetts Univ., Amherst.
ON THE SEMILATTICE OF WEAK ORDERS OF A SET Technical Report, 1 Jan. - 1 Mar. 1984
M. F. Janowitz Mar. 1984 20 p
(Contract N00014-79-C-0629)
(AD-A144631; TR-J8401) Avail: NTIS HC A02/MF A01 CSCL 12/1

Individual and collective preferences are often modelled using binary relations. Weak orders turn out to be especially useful for this purpose. The idea is to let X denote a set of alternatives and then rank X by preference. Thus xPy means y is preferable to x. The resulting binary relation P is often a weak order on X. Such relations also arise naturally in digital image processing. In its most general form, a (monochromatic) digital picture is simply a rectangular array of numbers that have spatial as well as numerical significance. Finally, weak orders arise in connection with the reconstruction of evolutionary trees. The underlying set here is a set of evolutionary units, and if the goal is to construct a binary tree on X that in some sense estimates the true evolutionary history of the currently existing members of X, then one can view this as constructing a nested sequence of weak orders on these members. GRA

N84-35024# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
TESTS FOR SPHERICITY UNDER CORRELATED MULTIVARIATE REGRESSION EQUATIONS MODEL
S. Sarkar and P. R. Krishnaiah Jul. 1984 33 p
(Contract F49620-82-K-0001)
(AD-A144658; TR-84-37; AFOSR-84-0666TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this report, the authors considered some tests for sphericity of the error covariance matrix under a correlated multivariate regression equations model. Asymptotic distributions of the test statistics associated with the above procedures are also derived.
Author (GRA)

N84-35025# Wisconsin Univ., Madison.
TRIANGULAR EXTRAPOLATION Summary Report
P. Alfeld (Utah Univ., Salt Lake City) Jun. 1984 26 p
(Contracts DAAG29-80-C-0041; DE-AL02-82ER-12046)
(AD-A144660; MRC-TSR-2707) Avail: NTIS HC A03/MF A01 CSCL 12/1

The general problem area addressed in this report is that of the interpolation of scattered bivariate data as these arise for example in the Computer Aided Geometric Design of geometric objects like the shape of a ship, or the fuselage and wings of an aircraft. Many existing techniques proceed by triangulating the domain and then defining the interpolant piecewise on each triangle. This approach has the drawback that the interpolant cannot be readily evaluated outside of the triangulated domain. This report deals with the problem of extending such a triangular interpolant. Existing methods are reviewed, new methods are introduced, and the methods are compared. It appears that at present no completely satisfactory techniques exist and that the subject requires more research. GRA

N84-35026# Wisconsin Univ., Madison. Mathematics Research Center.
MORSE THEORY FOR FLOWS IN PRESENCE OF A SYMMETRY GROUP Technical Summary Report
F. Pacella Jul. 1984 52 p
(Contract DAAG29-80-C-0041)
(AD-A144661; MRC-TSR-2717) Avail: NTIS HC A04/MF A01 CSCL 12/1

Different ways of studying an equivariant flow are investigated and, in particular, the equivariant Morse theory for flows is described. This theory requires results on the cohomology of classifying spaces for finite groups which are also described here. GRA

N84-35027# Wisconsin Univ., Madison. Mathematics Research Center.
THE GENERIC LOCAL TIME-OPTIMAL STABILIZING CONTROLS IN DIMENSION 3 Technical Summary Report
A. Bressan Jul. 1984 29 p
(Contract DAAG29-80-C-0041)
(AD-A144662; MRC-TSR-2710) Avail: NTIS HC A03/MF A01 CSCL 12/1

This work is part of a general program of research whose goal is to determine the local properties of control systems of a certain form from the linear relations among the Lie brackets of x and Y at p sub O. GRA

N84-35028# Wisconsin Univ., Madison. Mathematics Research Center.
MULTIVARIATE SCATTERED DATA DERIVATIVE GENERATION BY FUNCTIONAL MINIMIZATION
P. Alfeld Jun. 1984 48 p
(Contracts DAAG29-80-C-0041; DE-AC02-82ER-12046)
(AD-A144663; MRC-TSR-2703) Avail: NTIS HC A03/MF A01 CSCL 12/1

Many multivariate interpolation schemes require as data values of derivatives that are not available in a practical application, and that therefore have to be generated suitably. A specific approach to this problem is described that is modeled after univariate spline interpolation. Derivative values are defined by the requirement that a certain functional be minimized over a suitable space subject to interpolation of given positional data. In principle, the technique can be applied in arbitrarily many variables. The theory is described in general, and particular applications are given in one and two variables. A major tool in the implementation of the technique is the Bezier-Bernstein form of a multivariate polynomial. The technique yields visually pleasing surfaces and is therefore suitable for design applications. It is less suitable for the approximation of derivatives of a given function. Author (GRA)

N84-35029# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Mathematics.
ANALYSIS AND REGULATION OF NONLINEAR AND GENERALIZED LINEAR SYSTEMS Interim Report, 15 Jun. 1983 - 14 Jun. 1984
E. D. Sontag 26 Jul. 1984 10 p
(Contract F49620-79-C-0117; Grant AF-AFOSR-0196-80)
(AD-A144671; AFOSR-84-0694TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This work emphasizes research on discrete-time nonlinear system theory as well as algebraic methods in the analysis of generalized classes of linear systems. Author (GRA)

N84-35030# Wisconsin Univ., Madison. Mathematics Research Center.
NON-EXISTENCE OF GLOBAL SOLUTIONS OF PARTIAL OF F(U SUB T) WITH RESPECT TO T IN TWO AND THREE SPACE

DIMENSIONS Technical Summary Report
F. John Jul. 1984 24 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-84-01511)
(AD-A144692; MRC-TSR-2715) Avail: NTIS HC A02/MF A01 CSCL 12/1

Solutions of nonlinear hyperbolic partial differential equations often develop singularities spontaneously. Physically this phenomenon corresponds to the formation of shocks in nonlinear waves. One is confronted with the questions: What are the factors contributing to this blow-up of solutions? How long does it take for blow-up to develop, i.e., what is the life span T of the solution? What goes on precisely during blow-up? There is no general answer covering the great variety of situations encountered. A critical role certainly is played by the size of the initial disturbance that gives rise to the wave solution, and by the number of dimensions of the space in which the wave propagates. One finds that larger disturbances are more likely to result in shocks, and that, on the other hand, with increased dimension there are more possibilities for the wave to spread out and to decay, thus counteracting the formation of shocks. This document is concerned with a special type of second order nonlinear wave equation, whose behavior can be expected to be typical for a large class of equations occurring in applications, e.g., in the propagation of waves of finite amplitude in elastic materials. GRA

N84-35031# Wisconsin Univ., Madison. Mathematics Research Center.
RISING BUBBLES IN A TWO-DIMENSIONAL TUBE WITH SURFACE TENSION Technical Summary Report
J. M. VandenBroeck Jun. 1984 21 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-80-01960)
(AD-A144693; MRC-TSR-2705) Avail: NTIS HC A02/MF A01 CSCL 12/1

The motion of a two-dimensional bubble rising at a constant velocity U in a tube of width h is considered. The acceleration of gravity g and the surface tension T are included in the dynamic boundary condition. For T = 0, the results of Garabedian and Vanden-Broeck show that a solution exists for all values of the Froude number F = U/(gh) raised to the 1/2 power smaller than a critical value Fc approximately 0.36. In this paper accurate numerical solutions with T unequal to 0 are computed by series truncations. The results show that for each value of T unequal to 0, there exists a countably infinite number of solutions. Each of these solutions corresponds to a different value of F. As T tends to zero, all these solutions approach a unique limiting solution characterized by F = F approximately = 0.23. Therefore, the degeneracy associated with T = 0 is removed by including the effect of surface tension. In addition the profile corresponding to F = F is found to be in good agreement with experimental data.
Author (GRA)

N84-35032# Wisconsin Univ., Madison. Mathematics Research Center.
CONVERGENCE OF DIFFERENCE APPROXIMATIONS OF QUASILINEAR EVOLUTION EQUATIONS Technical Summary Report
M. G. Crandall and P. E. Souganidis Jul. 1984 36 p
(Contract DAAG29-80-C-0041)
(AD-A144694; MRC-TSR-2711) Avail: NTIS HC A03/MF A01 CSCL 12/1

The very successful theory of quasilinear evolution equations, which applies to many problems of mathematical physics, has been developed by T. Kato. The theory obtains solutions of quasilinear problems via contraction mappings which are defined by means of a theory of linear evolution equations also developed by Kato. In the current work we show how the existence and continuous dependence theorems obtained by Kato can be proved by discretization in time. As opposed to earlier work in this direction, the current results are much sharper concerning the continuity properties of the solutions of the discretized problem and the strength of the norms in which they converge. GRA

N84-35033# Karlsruhe Univ. (West Germany). Forschungsbereich Numerische Stroemungsmechanik.
THE SLxE PROGRAM FOR THE SOLUTION OF NONLINEAR SYSTEMS FOR ELLIPTIC DIFFERENTIAL EQUATIONS [SLXE-PROGRAMME ZUR LOESUNG VON NICHTLINEAREN SYSTEMEN VON ELLIPTISCHEN DIFFERENTIALGLEICHUNGEN]
K. Reith, G. Glotz, W. Schoensuer, and E. Schnepf Feb. 1983 336 p refs in GERMAN; ENGLISH summary
(Rept-23/83) Avail: NTIS HC A15/MF A01

A program package containing three packages for the solution of boundary value problems is described. Self adaptive solution methods for ordinary and partial differential equations were developed. Two program packages solve boundary value problems in rectangular domains with two and three coordinates respectively. They use difference formulas with variable orders and variable step sizes. The third package solves two dimensional boundary value problems in general (nonrectangular) domains. Author (ESA)

N84-34787# Materials Research Labs., Melbourne (Australia).
THE THEORY OF FOURIER DESCRIPTORS AND HOW THEY MAY BE USED TO CHARACTERIZE SHAPE
In its Extracts from Symp.: Countersurveillance 1983 May 1984 7 p refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34837# Army Materiel Test and Evaluation Directorate, White Sands Missile Range, N. Mex.
RANDOM NUMBERS FROM SMALL CALCULATORS
D. W. Rankin *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 203-217
(For primary document see N84-34927 24-59)
(AD-P003850) Avail: NTIS HC A17/MF A01 CSCL 12/1

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N84-35034# Northwestern Univ., Evanston, Ill.
MARKOV PROCESSES APPLIED TO CONTROL, REPLACEMENT AND SIGNAL ANALYSIS Interim Report, 1 Jun. - 31 Dec. 1983
E. Cinlar May 1984 8 p
(Grant AF-AFOSR-0189-82)
(AD-A144225; AFOSR-84-0591TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Research was performed during this period in four separate areas: Deformation of Solids and Stochastic Flows; Self-Exciting Point Processes; Stability of Dependent Random Variables; and Brownian Motion on Manifolds. This report summarizes progress in these areas. Author (GRA)

N84-35035# Texas Univ., Austin. Center for Cybernetic Studies.
INFORMATION-THEORETIC NON-PARAMETRIC UNIMODAL DENSITY ESTIMATION
P. Brockett, A. Charnes, and K. Paick Feb. 1984 21 p
(Contracts N00014-81-K-0145; N00014-82-K-0295)
(AD-A144522; CCS-RR-467) Avail: NTIS HC A02/MF A01 CSCL 09/4

This document presents an information-theoretic method for nonparametric density estimation which guarantees that the resulting density is unimodal. The method inputs data in the form of moment or quantile information and consequently can handle both data derived and non-data derived information. In the non-data derived situation it yields a method for obtaining unimodal Bayesian prior distribution. Author (GRA)

N84-34928# Army Research Office, Research Triangle Park, N.C.
A COMBINED BAYES-SAMPLING THEORY METHOD FOR MONITORING A BERNOULLI PROCESS

R. L. Launer and N. D. Singpurwalla *In its* Proc. of the 29th conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 23-26 (For primary document see N84-34927 24-59)
(AD-P003840) Avail: NTIS HC A17/MF A01 CSCL 12/1

N84-34829# Cornell Univ., Ithaca, N.Y. School of Operations Research and Industrial Engineering.
AN OPTIMAL SEQUENTIAL BERNOULLI SELECTION PROCEDURE
R. E. Bechhofer *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 27-48 (For primary document see N84-34927 24-59)
(Contract DAAG29-81-K-0168)
(AD-P003841) Avail: NTIS HC A17/MF A01 CSCL 12/1

N84-34830# Wisconsin Univ., Madison. Mathematics Research Center.
A NEW METHOD OF EVALUATING NORMAL AND t-TAIL AREAS
A. P. Soms *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 49-54 (For primary document see N84-34927 24-59)
(Contract DAAG29-80-C-0041)
(AD-P003842) Avail: NTIS HC A17/MF A01 CSCL 12/1

N84-34832# Army Logistics Center, Fort Lee, Va.
ON THE LEHMANN POWER ANALYSIS FOR THE WILCOXON RANK SUM TEST
J. R. Knaub, Jr. *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 107-130 (For primary document see N84-34927 24-59)
(AD-P003844) Avail: NTIS HC A17/MF A01 CSCL 12/1

N84-34935# Army Operational Test and Evaluation Agency, Falls Church, Va.
A TYPE OF CORRELATED DATA IN OPERATIONAL TESTING
E. Hertz *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 173-176 (For primary document see N84-34927 24-59)
(AD-P003848) Avail: NTIS HC A17/MF A01 CSCL 12/1

N84-34936# Army Materials and Mechanics Research Center, Watertown, Mass.
A SIMULATION PROCESS FOR DETERMINING RELIABILITY OF CYCLIC RANDOM LOADED STRUCTURES
D. Neal, W. Matthews, and T. DeAngelis *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 177-201 (For primary document see N84-34927 24-59)
(AD-P003849) Avail: NTIS HC A17/MF A01 CSCL 12/1

N84-34938# Army Natick Research and Development Command, Mass.
ACCEPTANCE OF A MEAL AND ITS COMPONENTS: AN EXERCISE IN MISSING DATA
E. W. Ross *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 235-257 (For primary document see N84-34927 24-59)
(AD-P003852) Avail: NTIS HC A17/MF A01 CSCL 12/1

N84-34939# Army Concepts Analysis Agency, Bethesda, Md.
NUMERICAL VALIDATION OF TUKEY'S CRITERION FOR CLINICAL TRIALS AND SEQUENTIAL TESTING
C. R. Leake *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 259-262 (For primary document see N84-34927 24-59)
(AD-P003853) Avail: NTIS HC A17/MF A01 CSCL 12/1

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N84-35036# SRI International Corp., Menlo Park, Calif.
RESEARCH ON PARALLELISM IN PROBLEM-SOLVING SYSTEMS Annual Report, 1 Sep. 1982 - 31 Aug. 1983
D. E. Wilkins 3 Jul. 1984 9 p
(Contract F49620-79-C-0188; SRI Proj. 8871)
(AD-A144414; AFOSR-84-0595TR) Avail: NTIS HC A02/MF A01 CSCL 12/2

This report describes the progress to date on work to date under the contract. Research on planning and problem-solving systems was begun at SRI International in September 1979. Progress has been described in detail in three annual reports (1980, 1981, and 1982). The main task of this research program is to develop powerful methods of representing, generating and executing hierarchical plans that contain parallel actions. Execution involves monitoring the state of the world and possibly replanning if things do not proceed as expected. Two different approaches to these problems are being pursued under this contract. The first is heuristic; it involves building an actual computer program that provides a representation from which it then generates plans. This approach comprises the majority of the effort on this project. The second approach is to investigate the theoretical foundations of planning. This will not, in all likelihood, result in a program, but it will formalize the planning problem and one solution to it.
Author (GRA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N84-35037# LuTech, Inc., Hayward, Calif.
ALTERNATIVE LABELLING SCHEMES IN ELECTROMAGNETIC TOPOLOGY Final Report, Oct. 1982 - Oct. 1983
R. S. Noss Kirtland AFB, N. Mex. AF Weapons Lab. Jun. 1983 26 p Prepared in cooperation with Dikewood Corp., Albuquerque, N. Mex.
(Contract F29601-82-C-0027)
(AD-A144300; AFWL-TR-84-21) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report defines the problems associated with applying graph theory to interaction sequence diagrams used in electromagnetic topology. Because few applications have been developed, the optimal labelling scheme has yet to emerge. As a result, operations on the graph are difficult to record concisely. This report contains criteria to guide the design of labelling schemes. Some specific schemes are presented and illustrated for a sample topology, and satisfaction of the criteria is discussed. Author (GRA)

N84-35040# National Chung Hsing Univ., Taichung (Taiwan).
SOME ALGEBRAIC PROPERTIES OF THE MONOID OF LANGUAGES AND ITS APPLICATIONS Abstract Only
Huei-Jan Shyr *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 5 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

N84-34931# George Washington Univ., Washington, D.C. Inst. for Reliability and Risk Analysis.
THE DESIGN OF A QUANTAL RESPONSE EXPERIMENT: AN EMPIRICAL APPROACH
R. Soyer *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 55-96 (For primary document see N84-34927 24-59)
(Contracts N00014-77-C-0263; DAAG29-80-C-0067)
(AD-P003843; GWU/IRRA/TR-83/2) Avail: NTIS HC A17/MF A01 CSCL 12/1

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N84-35038# National Science Council, Taipei (Taiwan). Science and Technology Information Center.
SCIENTIFIC RESEARCH ABSTRACTS IN REPUBLIC OF CHINA, 1983
Asionprint, Inc. Jun. 1984 851 p
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Abstracts of studies in agriculture, technology, science and medicine are given. Soils, field crops, mechanical engineering, geology, meteorology, computer programming and the F2 region are among the topics discussed. For individual titles, see N84-35039 through N84-35068.

N84-35039# National Science Council, Taipei (Taiwan).
REMOTE SENSING OF COASTAL ENVIRONMENT: THE ESTUARINE PROCESSES OF TA-TU RIVER Abstract Only c43
Jhy-Ming Lu (ITRI) *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 4 (For primary document see N84-35038 24-70)
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Multi-temporal LANDSAT MSS imagery, aerial photographs, and digital multispectral scanner data taken from 1972 to 1982 were used to study the estuarine processes. All the remotely sensed data revealed an unusual abundance, variety, and distinctness of discoloration and turbidity patterns and proved suitable for both qualitative and quantitative studies. The estuary of the Ta-Tu river was selected as the study area, which was seriously polluted by urban sewage and industrial waste water. This estuary lies in the central part of the western coast of Taiwan island, and is about 7.5 Km south of Taichung harbor. On the southern side of this estuary, a huge coastal industrial park is under construction on the tidal flats. The qualitative approach was used to map the polluted water plumes discharged in different oceanographic seasons and tidal conditions, while the quantitative analyses in which sea truth collected at a limited number of locations were used to calibrate remotely sensed digital data and to extend the results to the whole scene. The estimation of the relative importance and time-scale of the variety of physical parameters influencing the study area was made. Moreover, in summer season, the water motion were measured quantitatively from successive photographs in which the turbidity patterns remain recognizable from one photograph to the next. And a mathematical model was developed to simulate the process of this river. R.J.F.

N84-35040# National Chung Hsing Univ., Taichung (Taiwan).
SOME ALGEBRAIC PROPERTIES OF THE MONOID OF LANGUAGES AND ITS APPLICATIONS Abstract Only c67
Huei-Jan Shyr *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 5 (For primary document see N84-35038 24-70)
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Let X be an alphabet with more than one letter and let X* be the free monoid generated by X. Any subset of X* is called a language. The language theory has realistic applications in computer programming and communication technics. The purpose is to investigate when two languages A and B commute. Languages are elements of a monoid, and in the point of view of algebra it is certainly important to know when two languages commute. Suppose one wants to translate the catenation of two languages AB and if it happens to be AB = BA, then whether one translates A first or not, the result is the same. The general theory for which two languages commute is investigated. It is proved that for an injective homomorphism f,f(A)f(B) = f(B)f(A) if and only if AB = BA. If P sub A is the principal congruence determined by A, the language (1), the class of language contains the empty word 1, commuted with any other congruence classes. Those languages are studied which commute with some well-known context-free languages such as [a(n)b(n)/n > 1 Dyck] language and (w/w(a)=w(b) where w sub a means the number of letters occurring in w. R.J.F.

N84-35041# National Chung Hsing Univ., Taichung (Taiwan).
ON THE SKOROHOD REPRESENTATION Abstract Only c39
Shey-Shiung Sheu *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 6 (For primary document see N84-35038 24-70)
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Predicting the reliability of a structure based on the reliabilities of its constructing components is a realistic problem. This is desirable for economical and technical reasons. The life lengths of structures are examined under the following assumptions: (1) The structures consist of n components of the same kind. (2) The structures in use are all subjected to the imposition of an m-vector load at any time t. (3) Each load is shared by the surviving components in a manner governed by a structural load apportioning function. (4) The failure rate of a component is proportional to the total load it sustains at any time t. Formulas to find the reliability at any time t of parallel structures, series structure and k-out-of-n structures were found. A computer program is also provided in order to compute the reliability. R.J.F.

N84-35042# National Central Univ., Chung-Li (Taiwan).
A STUDY OF MULTISPECTRAL MODEL OF LAND COVER Abstract Only c43
Hsien-Ta Wang and Jer-Jinum Chen *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 9 (For primary document see N84-35038 24-70)
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Airborne multi-spectral scanner data was used to estimate the acreage of the rice paddy, the most important crop in Taiwan. The bidirectional reflectance of the rice paddy was measured using two GSFC/Mark II three band radiometers. The preliminary results show that, for TM4 and TM5 bands, the reflectance exhibits a strong dependence on observed and solar zenith angles. For a fixed solar zenith angle, the reflectance is larger for large vertical view angle, i.e., a V-shaped distribution. Thus, a complete understanding of the bi-directional reflectance distribution function, (BRDF), is needed to better utilize the airborne Mss data (note that the scanning range of our Daedalus 1260 scanner is about 80 deg). A Monte Carlo model was proposed to simulate the radiation-rice paddy interation. Results show: (1) for a given growing stage and each photon incident angle, about 100, 000 photons are needed to get statistical meaningful BRDF. (2) The V shape phenomena was correctly predicted, and (3) the simulated results agree quite well with measured data. R.J.F.

N84-35043# Ministry of Communications, Taipei (Taiwan). Telecommunication Labs.
ON THE STUDY OF THE PREDICTION METHOD OF IONOSPHERIC F2-LAYER CRITICAL FREQUENCY Abstract Only c46
Yang-Shyang Ju *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 9-10 (For primary document see N84-35038 24-70)
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The McNish-Lincoln method was used to predict the f sub 0 F sub 2 monthly median at Chung-Li area. Those prediction results were compared with those of the second-degree regression curve method. The conclusions are as follows: (1) the best prediction can be acquired when choosing two terms of f sub 0 F sub 2 correction term and one term of solar activity correction terms in calculation. (2) In the diurnal variation, the prediction errors are minimum in morning and maximum at midnight; in the seasonal variation, the minimum prediction errors occur in summer and the maximum in winter. Moreover, there is no correlation between the prediction errors and solar activity. (3) Except for one month predictions, the prediction errors of the second degree regression curve method are smaller than that of McNish-Lincoln method for other prediction periods. But no matter what the prediction period is, the predictions of McNish-Lincoln method are better than that of the second-degree regression curve at noon and dusk. However, the former are worse than the latter at nighttime. R.J.F.

N84-35044# National Central Univ., Chung-Li (Taiwan).
STUDY OF METAL-INSULATOR TRANSITION Abstract Only c26
Ta-Sun Yih, Tze-Ming Hsu, and Sheau-Huoy Chia *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun.

1984 p 12 (For primary document see N84-35038 24-70)
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The dc four probe method was used to measure the electrical resistivity of liquid tin between 214 C and 410 C. From the experimental data, it was found that the resistivity of liquid tin is nearly a linear function of temperature and the temperature coefficients of resistivity (TCR) gradually decreases as temperature rises. There is a a discontinuity in resistivity and TCR of liquid tin at the melting point. These experimental data are in good agreement with previous published data, the minor deviation of resistivity between the present work and earlier work may be caused by systematic error. The theoretical data, calculated by using structure factors and different pseudopotential formulations, are compared with the experimental data. It was found that each pseudopotential formulation reproduces the variation of resistivity versus temperature quite well, and for a fixed temperature the different pseudopotentials give rise to a wide range of theoretical resistivity values which scatter 6% to 56% from experimental result. There are two important factors in Ziman formula; one is structure factor and the other is pseudopotential. From the comparison of results, it can be shown that the variation of structure factors versus temperature is the main cause of resistivity-temperature relation. R.J.F.

N84-35045# Ministry of Communications, Taipei (Taiwan).
SOME PRELIMINARY RESULTS OF IONOSPHERIC SLAB THICKNESS OBSERVATIONS AT LUNPING Abstract Only c46
Yinn-Nien Huang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 15 (For primary document see N84-35038 24-70)
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The characteristic variations of the ionospheric slab thickness observed at Lunping Observatory were analyzed. The slab thickness data obtained from March 1977 to February 1982 were used to analyze the diurnal, seasonal, solar cycle and geomagnetic variations. The shape of the diurnal variation shows a remarkable seasonal change. In summer, there are one maximum appearing in prenoon hours and a subsidiary maximum appearing in post sunset hours. However, in winter and equinoctial months, unusually large peak appears in pre-sunrise hours. The amplitude of pre-sunrise peak also depends on solar activity. It is larger in minimum solar activity than in high solar activity. The seasonal variations of slab thickness at different hours depend on the variations of solar cycle. Ionospheric slab thickness exhibits remarkable lunar daily variations which is largest in winter and smallest in summer. The storm time variation and disturbance daily variation of slab thickness were obtained by selecting 138 strong and weak geomagnetic storms. Superposed epoch method was also used to analyze the geomagnetic activity effect on the variation of slab thickness. R.J.F.

N84-35046# Ministry of Communications, Taipei (Taiwan).
A FURTHER STUDY ON THE SPATIAL CORRELATION OF THE TOTAL ELECTRON CONTENT AT PAIRS OF SUBIONOSPHERIC POINTS LOCATED AT THE CREST ZONE OF THE EQUATORIAL ANOMALY Abstract Only c46
Yinn-Nien Huang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 15-16 (For primary document see N84-35038 24-70)
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The spatial correlation of the total electron content (TEC) in east-west direction at the crest zone of the equatorial anomaly is studied from simultaneously observed TEC data. Simultaneously observed TEC data is used to analyze the latitudinal difference and spatial correlation of TEC variations at the crest zone of the equatorial anomaly. The diurnal variations at two locations at same day are very different. The difference as large as 30 times ten to the 16th power electron per square meter is found. The monthly mean hourly TEC values observed at Lunping are smaller than those observed at Kaohsiung. The diurnal variation curves of the cross correlation coefficient obtained for each month are very different for different months. The day to day variability for the latitudinal TEC distribution at the crest zone of the equatorial anomaly is larger than other places. M.A.C.

N84-35047# National Central Univ., Chung-Li (Taiwan).
MODEL STUDY OF THE ATMOSPHERIC FRONTOGENESIS. 2: THEORETICAL MODEL Abstract Only c47
Huo-Ming Jian and Siu-Shung Hong *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 20-21 (For primary document see N84-35038 24-70)
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Frontogenesis, as a process of formation and dissolution of frontal zones is described. The frontogenetic processes often occur in Southern China, especially in fall and spring. The intensification of ageostrophic motion is dominant in frontogenetic process. The horizontal deformation fields may force the transverse circulation which is favorable to frontogenesis. The theoretical frontogenesis model and the numerical method are described. A two-time-scale process is considered. One is the fast adjustment time scale, and the other is the slow advection time scale. The adjustment process will generate the gravitational waves very quickly, while the slow variation of deformation fields will contrast the gravitational waves and intensify the geostrophic deviation. M.A.C.

N84-35048# Central Weather Bureau (Taiwan).
A STUDY OF TROPICAL CYCLONE INTENSITY FROM SATELLITE IMAGERY Abstract Only c47
Ling-Hsiao Chang and Shu-Gwun Chu *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 26-27 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Enhanced IR and visible imageries are used to provide a tropical cyclone intensity analysis. Procedures such as NESS enhanced curve, eye adjustment, curved band feature and pattern T-number are modified. Eight significant typhoon cases in 1981 and 1982 are selected. Accompanying weather charts and radar reports are chosen to analyze intensity and standard errors. M.A.C.

N84-35049# Chung Cheng Inst. of Tech. (Taiwan).
AN AUTOMATED TECHNIQUE FOR DETERMINING CLOUD VELOCITY FROM GMS DATA. 1: THE DESIGN AND CONSTRUCTION OF A SCANNING CONVERTER Abstract Only c47
Liang-Shur Su and Tsen-Bar Tsi *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 31-32 (For primary document see N84-35038 24-70)
Copyright. Avail: Issuing Activity

The design of a scanning converter used to determine cloud velocity from the geophysical monitoring satellite data is described. A 2.4 KHz modulated light signal is used as a source to get a modulated video signal with a light sensor from a rotating mechanical scanning device. The drum is rotated with a speed of 48 rpm and equipped with a light sensor. The modulated video signal can be stored in a magnetic tap E directly or demodulated by use of a image digitizer to obtain 1024 digital data during each scan. The display system is capable of handling 6- bit data for 256 gray levels. By the control of 3-buffers and some complicated electronic circuits, the 48 rpm scanning rate can be converted into 96 rpm, 120 rpm, or 240 rpm in order to fit the different kinds of display devices. M.A.C.

N84-35050# National Taiwan Univ., Taipei.
PRELIMINARY STUDY OF LANDSAT IMAGERIES OF TAIWAN AND ITS SURROUNDINGS Abstract Only c43
Yeun-An Fan *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 56 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

A collection of LANDSAT imageries of Taiwan and its surroundings is presented. The coastal water depth is measured using the LANDSAT 3 MSS imageries. Imagery interpretation methods and techniques include film density measurement. The LANDSAT coverage is divided into sub-regions for detailed investigation, using a color densitometer and a scanning microdensitometer. A

Correlation analysis is performed. A grid system for density measurement of LANDSAT imageries for the seas around Taiwan is presented. Depth of coastal water in selected study areas down to 30 meters below sea level is determined. The coastal water depth profiles and sea state image interpretation are also described. M.A.C.

N84-35051# National Science Council, Taipei (Taiwan).
THE GEOLOGIC STUDY OF TAIWAN AREA FOLLOWING UP THE ACQUISITION OF TAIWAN SLAR IMAGERY Abstract Only c46
Jin-King Liu *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 61 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

The general uses of SLAR imagery is investigated. Additional geologic data of the Central Mountain Range of Taiwan is presented. (1) The potential applications and related factors and parameters are studied and discussed in detail; an interpretation chart is worked out. Two main programs and four subroutines are set up to assist the analysis of SLAR lineaments and drainages. (2) SLAR lineaments reveal that there are four major sets of geologic structures on Taiwan Area, i.e., N29 deg E, N72 deg E, N30 deg W, and N66 deg W; nevertheless, only the N29 deg E trend was known previously. Through this study, the regional stress direction is concluded to be 125 deg in azimuth. Two tectonic patterns are discovered, the circular patterns surrounding Peikang Basement High and the NW/SE shear zone crossing the middle part of Taiwan Island. M.A.C.

N84-35052# National Central Univ., Chung-Li (Taiwan).
THE GEOLOGIC AND GEOPHYSICAL STUDY OF THE HENG-CHUNG PENINSULA, SOUTHERN TAIWAN, 1 Abstract Only c46
Tsang-Po Yen, Yu-Hua Tzou, and Kuo-Cherng Sung *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 62-63 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

A geophysical survey of the Hengchung Peninsula in southern Taiwan is presented. Topics include stratigraphy, aerial and satellite photoreconnaissance and the geomagnetism of the region. M.A.C.

N84-35053# National Taiwan Univ., Taipei.
APPLICATION OF COMPARTMENTALIZATION/AIR LOCK OF SIMULATED PRESSURIZED AIRCRAFT AND TOLERANCE OF LUNG TO RAPID DECOMPRESSION IN DIFFERENT LABORATORY ANIMALS Abstract Only c51
Hwai-Sze Fang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 100 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

The incidence of pulmonary hemorrhage of different laboratory animals undergoing rapid decompression is markedly decreased by using compartmentalization/air lock of simulated pressurized aircraft. In protected rabbits, mice and rats, 6 of 24(25%), 7 of 24(29%) and 6 of 24 lungs(255) exhibited a few petechial hemorrhages respectively following rapid decompression. In unprotected animals all lungs showed slight to very severe degrees of decompression-induced hemorrhages. The difference in incidence of such hemorrhages between protected and unprotected animals is statistically significant. The mortality percentage of the unprotected animals undergoing rapid decompression is 47%, with no deaths in protected animals. As far as the incidence of such pulmonary hemorrhages and the mortality of experimental animals are concerned, the present results indicate that the application of the compartmentalization combined with adequate air lock will be of great value in protection against accidental decompression of pressurized aircraft. M.A.C.

N84-35054# National Science Council, Taipei (Taiwan).
AN ALTERNATIVE MATHEMATICAL APPROACH TO MOVEMENT AS COMPLEX HUMAN BEHAVIOR Abstract Only c81
Hsiao-Fan Wang (ITRI) *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 441-442 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Industrial automation in the ROC was investigated, also the production automation in Japan, USA, West Germany and France. Realizing the current environment of industrial automation, an eight-year project for the promotion of production automation in the ROC by consulting the strategies for developing production automation in the above advanced countries was drawn up. The project (from July 1982 to June 1990) was passed in the 1794th Executive Yuan meeting. Its aim is to increase the productivity of electronic, mechanical, textile, plastic, and food processing industries as well as explore international markets. The main point lies in developing automation industry. MOND, CEPD, MOF, MOI, MOE, and NSC were summoned by MOEA to establish Production Automation Committee which is responsible for the implementation of the project. There are five subdivisions under the committee: (1) Industrial Automation Div.: summoned by Industrial Bureau; (2) Automation Industry Div.: summoned by ITRI; (3) Automation Personnel Cultivation Div.: summoned by NSC; (4) Automation Manpower Training Div.: summoned by MOI; and (5) Financial Support Div.: summoned by CEPD. According to the implementation guidelines of the project, each division should draw up 19 implementation items. These items were passed in the third meeting of the Implementation Committee. Author

N84-35055# National Taiwan Univ., Taipei.
ANALYSIS OF FATIGUE CRACK PROPAGATION OF STRUCTURAL STEEL MEMBERS SUBJECTED TO VARIABLE AMPLITUDE FATIGUE STRESS Abstract Only c39
I-Chau Tsai *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 451-452 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Fatigue life of members made of A36, A572, A514 structural steel subjected to variable amplitude fatigue stress were studied. Retardation effect of crack propagation and variable amplitude fatigue stress induced by highway traffic in bridge members were considered. Monte Carlo method was used to simulate fatigue stress range in bridge members induced by traffic loading which was random variable with truncated Rayleigh distribution and Wheeler model was used to describe retardation effect. Four methods were used to calculate respectively the fatigue life of structural steel members in tension with either central crack or edge crack: cycle by cycle integration method; repeated stress block method; cycle by cycle integration without retardation method; and root mean square stress method. Fatigue lives from different methods were compared and the impartance of retardation effect was discussed. Rational choice of equivalent constant amplitude fatigue stress was also an important subject. The ratio of equivalent constant amplitude fatigue stress to root mean square fatigue stress ranges from 0.97 to 1.07. The ratio decreases when parameter m in wheeler model increases. Fatigue life of member will be easily calculated when equivalent constant amplitude fatigue stress was decided. Author

N84-35056# Feng Chia Univ., Taichung (Taiwan).
ELASTIC WAVE PROPAGATION IN A PERIODICALLY TRILAMINATED COMPOSITE Abstract Only c24
Ti-Chiang Lee *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 484 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Elastic waves in a trilaminated periodic composite are investigated. Wave propagation normal to the layers is considered. Integration of the basic equations of motion for the individual layers followed by a combination of the interface conditions between the layers then leads to a continuum theory for the trilaminated periodic composite when waves propagate in the direction normal to the layers. The theory consists of three equations of motion and three constitutive equations. These equations are all expressed in terms of stresses and displacements at the centroids of the layers. Finally, applications of the theory are given and the numerical results are plotted in graphs. Author

N84-35057# National Chung Hsing Univ., Taichung (Taiwan).
BOUNDARY LAYER THERMAL STRESSES IN CROSS-PLY COMPOSITE LAMINATES Abstract Only c24
Chien-Chang Lin *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 484 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

The boundary-layer thermal stress singularities and distributions in cross-ply composite laminates subjected to uniform thermal loading are investigated. By using anisotropic elasticity field equations and Airy stress functions, a system of governing partial differential equations is obtained in terms of two stress functions. Employing Lehknitskii's complex stress function technique, one obtains the homogeneous solutions which are required to satisfy the homogeneous boundary conditions and the interface continuity conditions. These lead to an eigenvalue problem which determines the boundary-layer stress singularity. Thermal boundary-layer stresses are determined by an eigenfunction expansion technique and the establishment of an appropriate particulars solution. Numerical examples considered are symmetric cross-ply composite laminates which each layer is made of high-modulus graphite/epoxy. Author

N84-35058# National Taiwan Univ., Taipei.
EFFECT OF STACKING SEQUENCE ON FATIGUE LIFE OF COMPOSITE MATERIALS Abstract Only c24
Yuan-Fang Chou and Hsiang Chin *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 485 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Interface delaminating is one of the major modes of fatigue failure of laminated composite materials. This kind of failure mode is due to singularity of interlaminate stresses at free edges of laminates. Different interlaminate stresses will be developed by different stacking sequences. Therefore the stacking sequence will affect the fatigue life of laminates. In this research, the sum of Tau (sub xy) of lamines ranged from free surface to the interface concerned is taken as a parameter to evaluate the life to delaminate. Results show that a correlation between the parameter and the life to delaminate can be found. Therefore, the parameter can be considered as a design factor for laminates such that a longer fatigue life can be achieved. Author

N84-35059# National Cheng Kung Univ., Tainan (Taiwan).
VIBRATIONS AND STABILITY OF THICK PLATES Abstract Only c39
Lien-Wen Chen *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 488-489 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

The stability and free vibration problems of a rectangular thick plate under arbitrary initial stress are considered, and solved by finite strip method. The initial stress is taken to be a uniform compressive (or tension) stress plus a bending stress. The effects of boundary condition are investigated. The matrix equations of a finite strip are derived by using the principle of minimum potential energy. The effects of various parameter on stability and free vibration are studied. The buckling coefficients and natural frequencies are shown to decrease as the transverse isotropic coefficient, aspect ratio and thickness ratio increase. The rigid support conditions have more significant effect than the soft support conditions. Author

N84-35060# National Cheng Kung Univ., Tainan (Taiwan).
POST-BUCKLING OF INITIALLY STRESSED THICK PLATES Abstract Only c39
Lien-Wen Chen and Ji-Liang Doong *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 489 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Nonlinear equations of motion for a transversely isotropic thick plate in a general state of nonuniform initial stress where the effects of transverse shear and rotary inertia are included are derived. The post-buckling behavior of a simple supported rectangular thick plate subjected to arbitrary loading condition is investigated. The applied stress is taken to be a combination of a pure bending stress plus an extensional stress in the plane of the plate. These equations are used to solve the post-buckling problem by Galerkin method. Buckling loads are obtained to compare with the results of Brunelle and Robertson. Post-buckling deflection is shown to increase with the transverse isotropic coefficient S, and the effects of the in-plane bending stress are found to be quite significant for a thick plate. Author

N84-35061# National Tsing Hua Univ., Hsinchu (Taiwan).
STRESS ANALYSIS OF FOAM SANDWICH SEMI-MONOCOQUE STRUCTURES Abstract Only c39
Ching-Cheng Chao *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 489-490 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Stress analysis of foam sandwich semi-monocoque structures in which longitudinal web-stiffeners are incorporated in the polyurethane foam sandwich cylinder in an attempt to achieve improvement of structural stiffness, ease of joint design and cost reduction in core material for widened engineering structural applications are examined. The exact differential equations of equilibrium are derived for the thick-walled composite cylindrical shells by taking the transverse shear strains into consideration. There are five variables for displacements and shear rotations instead of only three for displacements in the conventional thin shell theory. The composite sandwich cylinders are simply supported at both ends with five boundary conditions straightforward for each edge in contrast to three for plates and shells in general and four for classical lamination of composites by way of the Kirchhoff force concept. The composite sandwich cylinders are subjected to uniformly distributed line loads in crushing and bending exerted along the web-stiffener(s). Solutions are obtained by means of the composite shell panel method in using the given boundary and interface conditions. Comparison of numerical results for the non-web-stiffened and four-web-stiffened foam sandwich cylinders shows significant advantage of the foam sandwich semi-monocoque structures in all respects. Author

N84-35062# Chung Yuan Univ., Chung Li (Taiwan).
STABILITY ANALYSIS OF ELASTIC-PLASTIC RECTANGULAR PLATE WITH OPENING Abstract Only c39
Jeng-Sheng Huang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 491 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

The buckling phenomenon of an elasto-plastic flat plate with a hole was studied. The finite element method is used for this stability analysis of aero-structural chromium-nickel steel and aluminum alloy plates. The plates were subjected to uniaxial or biaxial compressed forces under various ratios of length to width and different boundary conditions. By introducing Ramberg and Osgood three parameter modulus stress-strain relations and Stowell's plastic geometric deformation theory into the strain energy, the bending and initial stiffness matrices are obtained. From the buckling criterion, the buckling stability loads are found. The results of buckling loads as a function of the location of the hole in the plate are presented in tables and charts. Furthermore, the results of a plate without holes are compared with the results obtained experimentally. R.S.F.

N84-35063# National Science Council, Taipei (Taiwan).
THE RESEARCH AND FABRICATION OF ELECTRONIC MATERIALS AND THE ESTABLISHMENT OF CHARACTERIZATION CENTER OF ELECTRONIC MATERIALS Abstract Only c33
Kuo-Ian Ni (ITRI) *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 498 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Si-doped GaAs and undoped semi-insulating GaAs single crystals were grown by the liquid encapsulated Czochralski

technique. A horizontal sliding liquid phase epitaxy system was set up to grow GaP epilayers used for red LED fabrication. The thickness of epilayers are controllable by the cooling rate and range. By choosing appropriate material for the growth boat and purging atmosphere, oxygen was doped into the epilayer. Electroluminescence results show the emission spectrum peaks of the present diodes are around 965 mm, which is somewhat longer than that of the commercial products. This is possibly due to higher silicon concentration in the liquid. Future plans include setting up the fundamental electrical and optical properties measurement systems: 1-V/C-V measurement, Van der Pauw/Hall measurement, and electroluminescence/photoluminescence.
R.S.F.

N84-35064# National Tsing Hua Univ., Hsinchu (Taiwan).
INTERFACIAL REACTIONS OF NICKEL AND COBALT THIN FILMS ON SILICON Abstract Only c26
Lih-Jiunn Chen *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 499-500 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

Interfacial reactions of nickel thin films on silicon induced by thermal annealing and As(+) ion beam mixing were investigated. Transmission electron microscopy, Rutherford backscattering spectrometry, and four point probe sheet resistivity measurements were applied in the study. Results show that Ni2Si and NiSi exhibit preferential orientation relationship with respect to (111)Si. Ni2Si and NiSi are found to form more rapidly on (100)Si than on (111)Si. For As(+) implantation, amorphization of the interface region occurs at a dose of 5 x 10 to the 14th power/sq cm. Interfacial reactions of cobalt thin films with silicon and silicon dioxide substrates induced by thermal annealing and ion beam mixing were also investigated. Co thin films are found to react much more rapidly with (001) Si than (111)Si. Polycrystalline to epitaxial CoSi transition is more difficult on (001)Si than on (111)Si. The two step annealing process is very effective in promoting more uniform epitaxial CoSi growth on both (001)Si and (111)Si. The As(+) ion beam induces Co grain growth and silicide formation.
R.S.F.

N84-35065# National Tsing Hua Univ., Hsinchu (Taiwan).
LARGE SCALE SOFTWARE DEVELOPMENT PROJECT ON THE DESIGN OF A COMPUTER NETWORK SYSTEM Abstract Only c62
Chia-Tung Lee, Wen-Tsuen Chen, and Hsiao-Chuan Wang *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 511-512 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

The design and implementation of a computer network consisting of two PDP11 computers, all under the RSX-11M operating system are described. This is a resource sharing system in the sense that a user on any computer is able to freely use any utility of the other computer. This is accomplished by intercomputer intertask communication. Thirteen primitives are provided to the FORTRAN users to use the network system. That is, a user who wants to use the network system only has to be familiar with thirteen FORTRAN subroutine calls. He never has to understand how this system was implemented. Many application programs, such as an electronic conference system, an electronic mailing system, and a printer server were developed by using these thirteen primitives. Author

N84-35066# National Taiwan Univ., Taipei.
DESIGN AND IMPLEMENTATION OF A REENTRANT PAGE EDITING PROCESSOR Abstract Only c82
Chien-Ping Wu and Cheng-Yuan Hsieh *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 512 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

A reentrant page editing processor was designed to overcome the disadvantages of the conventional line or character string editors, and yet keep the latter's original merits. There were four major parts of this design work: (1) the design methodology of a reentrant processor and its attributes pertaining to the operation system; (2) the management of the file system and its relations to the operating systems; (3) the relations between the control of page data block and the system's peripherals and its I/O handlers; and (4) the functions analysis and design of a page editing processor. The execution of this project was divided into four steps: the analysis and specification of data structures and their formats, the specification and physical design of algorithms, the analysis of modularity, and the implementation and performance evaluation on PRIME 750. Author

N84-35067# Academia Sinica, Nankang, Taipei (Taiwan).
ON EXTENDING FUNCTIONAL CAPABILITIES OF CELLULAR-LOGIC DEVICES FOR DATABASE MANAGEMENT Abstract Only c82
Yang-Chang Hong and Jeh-Sheng Ke *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 513 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

A hardware architecture which is capable of providing powerful join capabilities to associative processing systems is described. The main feature of the hardware is a bit and word addressable store, RAM, which rapidly remembers or recalls data. Potential data includes the values/tuples selected from one relation in which case the RAM helps perform the joining of these values/tuples with the tuples in the second relation. For the general case of the join, the RAM helps on dividing the tuples of the relations being joined into buckets according to different value intervals of their join columns. An array of servers is introduced for producing the concatenated tuples of this join. This hardware design emphasizes parallelism in the cross referencing involved in the join operation.
R.S.F.

N84-35068# National Chiao Tung Univ., Hsinchu (Taiwan).
A COMPUTER PROGRAM DESIGNED FOR CONTOUR CHART PLOTTING Abstract Only c61
Kang Cheng *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 516 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

The contour chart is a powerful tool in the analysis of data. However, drawing a contour chart by the traditional manual process is tedious work, and requires much time. A method to draw a two dimensional contour chart by plotter is proposed herein. A computer program package was developed using FORTRAN 77 language to perform the plotting process in the VAX-11/780 computer system. A CALCOMP 960 plotter was installed as its peripheral device. Using this package, it is possible to plot out the isolines of a contour chart and label the value of each isoline. Furthermore, the density of isolines can be appropriately adjusted. In comparing the time needed for drawing the contour chart by plotter and by manual process, the contour chart as illustrated in this report took only three minutes by using the plotter. However, it took about six hours by using the manual process. Another advantage of this package is that it only requires a small memory for execution.
R.S.F.

N84-35069# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Physics.
ADVANCED STUDIES OF INTEGRABLE SYSTEMS Interim Report, 6 Jan. 1983 - 31 May 1984
D. J. Kaup 26 Jun. 1984 25 p
(Grant AF-AFOSR-0154-82)
(AD-A144122; AFOSR-84-0583TR) Avail: NTIS HC A02/MF A01 CSCL 21/2

A scientific report is presented covering publications resulting from a one year study of advanced topics in integrable systems. These publications cover studies on: Soliton Dynamics in the Pressure of External Forces; Nonlinear Scattering of Whistlers by Electro-Static Fluctuations; The Force Toda Lattice: An example of an almost integrable system; The Soliton Birth Rate in the

Forced Toda Lattice; and Whistler Scattering From Density Fluctuations in Magnetized Plasmas. Author (GRA)

N84-35070# International Centre for Theoretical Physics, Trieste (Italy).
SELECTION RULES FOR THE SPONTANEOUS PHASE TRANSITIONS IN MAGNETOELASTIC METAMAGNETS
P. Pawlicki Aug. 1983 11 p refs Submitted for publication
(DE84-701200; IC-83/119) Avail: NTIS HC A02/MF A01

The possibility of order-order phase transitions with temperature change for the magnetic model with coupling to the homogeneous strain is considered. Ten sequences of two and three phases are found and the corresponding conditions for the model parameters are established and visualized in the phase diagram. Author

N84-35071# Joint Publications Research Service, Arlington, Va.
EAST EUROPEAN REPORT: SCIENCE AND TECHNOLOGY
15 Aug. 1984 55 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-031) Avail: NTIS HC A04/MF A01

Topics relating to computer technology and electronics are addressed. The development of computer technology from its earliest beginnings to the present is traced. Several types of analog to digital converters are described, and the design of the EC 1027 computer system is discussed. The development and status of hydrological and meteorological monitoring in Romania are reviewed. For individual titles, see N84-35072 through N84-35076.

N84-35072# Joint Publications Research Service, Arlington, Va.
SELECTIONS ON COMPUTER TECHNOLOGY IN CSSR: COMPUTERS YESTERDAY AND TODAY c60
M. Okrouhlik *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 1-12 refs Transl. into ENGLISH from Sdelovaci Tech. (Prague), no. 3, 1984 p 86-89 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

The development of computer technology is traced from the abacus, Pascal's calculating machine, Babbage's differential calculating machine, and Zuse's Z1 computer to contemporary microprocessors, minicomputers, and supercomputers. Computer memory capabilities, computer networks, integrated circuits, and distributed processing are discussed. Computer development worldwide is mentioned. R.S.F.

N84-35073# Joint Publications Research Service, Arlington, Va.
MONOLITHIC 8-BIT CONVERTER c60
Jiri Jilek *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 12-23 refs Transl. into ENGLISH from Sdelovici Tech. (Prague), no. 3, 1984 p 93-95 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

The ZN427 analog to digital converter (A/D) is a fast 8-bit monolithic converter operating on the principle of successive approximation. It comes equipped with a three-state output for easy connection to a microprocessor bus bar. The integrated circuit contains a D/A converter, a fast comparator, logic for step-by-step approximation, and a reference source. It is also possible to use an external fixed or variable source of reference voltage, thus expanding the circuit's applications. The input signal can be unipolar or bipolar. Conversion time is 10 microsec at maximum time pulse frequency of 900 to 1000 kHz. The properties of the converter are guaranteed for a temperature range of 0 C to +70 C (variant E*) and -55 C to +125 C (JE). The converters come in a plastic or ceramic DIL 18 casing. The output is compatible with TTL and CMOS logic. Author

N84-35074# Joint Publications Research Service, Arlington, Va.
MICROCOMPUTER-AIDED A/D CONVERTERS c60
Peter Mifkovic *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 23-26 ref Transl. into ENGLISH from Sdelovaci Tech. (Prague), no. 3, 1984 p 97-98 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

Converters of analog voltage to digital form for microcomputers commonly find application as compensational types. The application of other types is less common. The advantages offered by the use of two types of converters operating with an integrating amplifier are addressed. It is a two-cycle integrating converter and a converter with a simple intermediate conversion in time. In either case, the converter logic with counter is replaced by a microcomputer. Author

N84-35075# Joint Publications Research Service, Arlington, Va.
EC 1027 COMPUTER SYSTEM c60
Josef Cmiral *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 34-38 Transl. into ENGLISH from Vyber Informaci (Prague), no. 2, 1984 p 197-199 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

The EC 1027 computer system is described in terms of its operating processor, organizer, main memory, service module, communication module, and multiplex module. R.S.F.

N84-35076# Joint Publications Research Service, Arlington, Va.
CURRENT CONCERNS IN FIELDS OF HYDROLOGY, METEOROLOGY c42
C. Diaconu *In its* East European Rept.: Sci. and Technol. (JPRS-ESA-84-031) 15 Aug. 1984 p 47-52 Transl. into ENGLISH from Stiinta si Tehnica (Bucharest), Jun. 1984 p 13-18 (For primary document see N84-35071 24-70)
Avail: NTIS HC A04/MF A01

The development and status of hydrological and meteorological monitoring in Romania are reviewed. Stations which monitor meteorological parameters and air quality are discussed briefly along with hydrometric stations which measure such conditions as river levels, water flow, and ice. The application of the data generated to meteorological and hydrological forecasts is mentioned. R.S.F.

N84-35077# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
17 Jul. 1984 48 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-025) Avail: NTIS HC A03/MF A01

Areas of science and technology covered include international affairs, ultrasonics, microelectronics, pesticides, ocean resources for food, nuclear power plants, and computer techniques. For individual titles, see N84-35078 through N84-35084.

N84-35078# Joint Publications Research Service, Arlington, Va.
CEMA COMPUTER COOPERATION, PROBLEMS DESCRIBED: APPLICATION OF BRITISH TECHNOLOGY c82
Jozef F. Lewoc *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 1-9 refs Transl. into ENGLISH from Informatyka (Warsaw), no. 3, Mar. 1984 p 5-8 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

The common comments concerning the performance of computers of the Uniform System are at variance with statements that the system is a model of appropriate and well-implemented approach to computerization problems in Poland and CEMA nations. On the other hand, the quality of Polish computer equipment is highly valued worldwide, as evidenced, among other things, by the scope of exports. In the framework of the Interschool Computer System an experiment was conducted to compare the performance of similar operations in TSO + TCAM systems using the R-32 computer and the Minimop using the Odra 1325 computer. Author

N84-35079# Joint Publications Research Service, Arlington, Va.
CEMA COMPUTER HARDWARE COOPERATION c60
Krzysztof Urbaniec *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 9-12 Transl. into ENGLISH from Informatyka (Warsaw), no. 3, Mar. 1984 p 26 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

User programming and user applications are coordinated by the Council for Applications of Computer Hardware. Research projects and the development of user software packages are discussed. Coordination of current activities and policies are explained. B.G.

N84-35080# Joint Publications Research Service, Arlington, Va.
R-35 COMPUTER SHORTCOMINGS c60
Teresa Wliczec *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 13-15 Transl. into ENGLISH from Informatyka (Warsaw), no. 4, Apr. 1984 p 26-27 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

An assessment of the R-35 computer is given covering both assets and liabilities. B.G.

N84-35081# Joint Publications Research Service, Arlington, Va.
SOCIALIST COUNTRIES COOPERATE IN COMPUTER R AND D c60
Krum Lazarov *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 17-20 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 67-69 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

Problems related to improving and raising the level of cooperation among scientists from socialist countries in the field of computer technology and information science are discussed. B.G.

N84-35082# Joint Publications Research Service, Arlington, Va.
INVENTIONS, NEW TECHNOLOGIES APPROVED BY ACADEMY OF SCIENCES: INVENTION USING ULTRASOUND Abstract Only c71
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 21-22 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 93-94 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

A method for determining contact pressures in wrapped instruments and the devices for measuring the contact pressure are discussed. B.G.

N84-35083# Joint Publications Research Service, Arlington, Va.
DEVICE FOR MEASURING OXYGEN Abstract Only c35
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 22-23 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 94 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

A digital electronic device for measuring traces of oxygen in superfine and inert atmospheres was developed. The digital oxymeter operates on the principle of continuous electrochemical reduction of oxygen on a cathode-polarized selective oxygen electrode. The special structure of the selective electrode ensures a reading of the device independent of nature, temperature and total pressure of the gas mixture. Author

N84-35084# Joint Publications Research Service, Arlington, Va.
DIGITAL ELECTRONIC HYGROMETER Abstract Only c35
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 23-24 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 95 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

The Betatest NM-2000 digital electronic hygrometer is designed for measuring the partial pressure of water vapor in superfine, inert, dry, and reduction atmospheres, such as nitrogen, air, hydrogen, argon, helium, carbon dioxide, and so forth. The operating range is from 1 to 2000 ppm. B.G.

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N84-35085*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SUPERSONIC JET SHOCK NOISE REDUCTION
James R. Stone 1984 45 p refs Presented at 9th Aeroacoust. Conf., Williamsburg, Va., 15-17 Oct. 1984
(NASA-TM-83799; E-2299; NAS 1.15:83799) Avail: NTIS HC A03/MF A01 CSCL 20A

Shock-cell noise is identified to be a potentially significant problem for advanced supersonic aircraft at takeoff. Therefore NASA conducted fundamental studies of the phenomena involved and model-scale experiments aimed at developing means of noise reduction. The results of a series of studies conducted to determine means by which supersonic jet shock noise can be reduced to acceptable levels for advanced supersonic cruise aircraft are reviewed. Theoretical studies were conducted on the shock associated noise of supersonic jets from convergent-divergent (C-D) nozzles. Laboratory studies were conducted on the influence of narrowband shock screech on broadband noise and on means of screech reduction. The usefulness of C-D nozzle passages was investigated at model scale for single-stream and dual-stream nozzles. The effect of off-design pressure ratio was determined under static and simulated flight conditions for jet temperatures up to 960 K. Annular and coannular flow passages with center plugs and multi-element suppressor nozzles were evaluated, and the effect of plug tip geometry was established. In addition to the far-field acoustic data, mean and turbulent velocity distributions were measured with a laser velocimeter, and shadowgraph images of the flow field were obtained. Author

N84-35082# Joint Publications Research Service, Arlington, Va.
INVENTIONS, NEW TECHNOLOGIES APPROVED BY ACADEMY OF SCIENCES: INVENTION USING ULTRASOUND Abstract Only
In its East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-025) 17 Jul. 1984 p 21-22 Transl. into ENGLISH from Spisanie na Bulgarskata Akad. na Naukite (Sofia), no. 2, 1984 p 93-94 (For primary document see N84-35077 24-70)
Avail: NTIS HC A03/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N84-35086*# National Aeronautics and Space Administration, Washington, D. C.
THE CALCULATION OF MOLECULAR EIGEN-FREQUENCIES
F. A. Lindemann Sep. 1984 12 p refs Transl. into ENGLISH from Phys. Z. (West Germany), v. 11, no. 14, 1910 p 609-612 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASW-3542)
(NASA-TM-77759; NAS 1.15:77759) Avail: NTIS HC A02/MF A01 CSCL 20H

A method of determining molecular eigen-frequencies based on the function of Einstein expressing the variation of the atomic heat of various elements is proposed. It is shown that the same equation can be utilized to calculate both atomic heat and optically identifiably eigen-frequencies - at least to an order of magnitude - suggesting that in both cases the same oscillating structure is responsible. M.G.

N84-35087# La Jolla Inst., Calif.
LOW-ENERGY COLLISIONS EXCITED ATOMS Final Report, 1 May 1982 - 30 Apr. 1984
R. H. Neynaber and S. Y. Tang 30 Jun. 1984 11 p
(Contract F49620-82-K-0023)
(AD-A144192; AFOSR-84-0820TR) Avail: NTIS

HC A02/MF A01 CSCL 20/8

The report describes molecular-beam studies of ion-pair production, charge transfer, and measurements of the fraction of excited Na atoms in a composite beam of ground-state and exicted Na atoms. Some of the experiments involved laser excited Na as a reactant. Included are investigations of the Na-Br, doubly charged Ar-Ar, Ne ion-metastable He, excited Na-Na, and Li-Na systems. GRA

N84-35088# Maryland Univ., College Park. Dept. of Electrical Engineering.

INVESTIGATION OF ION BEAM PRODUCTION AND ACCELERATION USING LINEAR ELECTRON BEAMS AND A PULSE POWERED PLASMA FOCUS Final Progress Report, 1 Apr. 1983 - 31 Mar. 1984

Mar. 1984 73 p

(Grant AF-AFOSR-0145-83)

(AD-A144525; AFOSR-84-0641TR) Avail: NTIS HC A04/MF A01 CSCL 20/7

An intense relativistic electron beam cannot propagate in a metal drift tube when the current exceeds the space charge limit. Very high charge density and electric field gradients (100 to 1000 MV/m) develop at the beam front and the electrons are reflected. When a neutral gas or a plasma is present, collective acceleration of positive ions occur, and the resulting charge neutralization enables the beam to propagate. Experimental results, theoretical understanding, and schemes to achieve high ion energies by external control of the beams front velocity will be reviewed. Author (GRA)

N84-35089# Arizona Univ., Tucson. Engineering Experiment Station.

ANALYTIC SOLUTION OF THE SPENCER-LEWIS ANGULAR-SPATIAL MOMENTS EQUATIONS Final Report, 1 Jun. 1983 - 31 May 1984

W. L. Filippone 31 Jul. 1984 53 p

(Grant AF-AFOSR-0174-83)

(AD-A144609; AFOSR-84-0697TR) Avail: NTIS HC A04/MF A01 CSCL 20/8

An exact solution for the angular-spatial moments of the Spencer-Lewis equation is given, along with methods for reconstructing the electron density function. The new solution techniques is implemented in a computer code and several sample calculations are carried out with monoenergetic plane sources of electrons in infinite media of aluminum and carbon. The sample calculations produce the electron distribution in space and path length rather than some integrated quantity such as the energy deposition profile. Such analytic solutions are intended to serve as benchmarks for testing numerical electron transport codes. Author (GRA)

N84-35090# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

STUDY OF TOTAL GAMMA SPECTRA CORRELATION FOR EXTENDING IDENTIFICATION RANGE OVER PHOTOPEAK ANALYSIS M.S. Thesis

A. W. Dooley Mar. 1984 154 p

(AD-A144637; AFIT/GNE/PH/84M-2) Avail: NTIS HC A08/MF A01 CSCL 20/8

This report shows that gamma spectra identification by total flux correlation can be used to extend identification range over photo peak methods. Identification was based on two decision rules both employing cross-correlation coefficients. The largest coefficient (first decision rule) matched the unknown spectra with the correct source thirty-seven out of thirty-eight trials. The proposed likelihood function (second decision rule) had a success rate of thirty-five out of thirty-eight trials. These results were based on spectra generated by the transport code, Morse. Author (GRA)

N84-35091# Oak Ridge National Lab., Tenn.

STUDIES OF COMPOUND STATES OF ATOMIC NEGATIVE IONS USING LASER BEAMS

R. N. Compton and G. D. Alton Jul. 1984 32 p

(Contract DE-AC05-84OR-21400; NR Proj. 393-071; RR01103)

(AD-A144653) Avail: NTIS HC A03/MF A01 CSCL 20/8

This research involves experimental studies of compound states of atomic negative ions using laser beams. Negative ion beams of stable and meta-stable species are generated by double charge exchange from positive ion beams colliding with alkali vapor. Measurements of the photodetachment and auto-detachment spectra for these ions provide new information on compound state energy levels. In addition, new experiments are underway to study the collisions of electrons with atoms in strong laser fields. Many theoretical predictions have been presented recently on this subject. These experiments should provide the first tests of such predictions. GRA

N84-35092# International Centre for Theoretical Physics, Trieste (Italy).

ELASTIC SCATTERING OF POSITRONS WITH HYDROGEN AND LITHIUM ATOMS AT INTERMEDIATE ENERGIES

K. C. Mathur and R. S. Pundir (Roorkee Univ.) Jun. 1983 19 p refs Submitted for publication

(DE84-701187; IC-83/58) Avail: NTIS HC A02/MF A01

The elastic scattering of positrons with hydrogen atoms (energy range 200 to 500 eV) and with lithium atoms (energy range 60 to 400 eV) is studied in the framework of a two-potential approach. The incident particle distortion (both in the initial and final channels) and target polarization are considered. The results are compared with the other available calculations. A good agreement with some calculations based on third order optical potential method is obtained for higher energies. Author

N84-34480*# Aerodyne Research, Inc., Billerica, Mass.

HYPERVELOCITY SUPERSONIC NOZZLE BEAM SOURCE OF ATOMIC OXYGEN

A. Freedman, W. Unkel (Massachusetts Inst. of Tech., Cambridge), J. Silver, and C. Kolb *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 146-149 refs Prepared in cooperation with Utah State Univ. (For primary document see N84-34468 24-18)

Avail: NTIS HC A13/MF A01 CSCL 20H

N84-34481*# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.

A FACILITY FOR INVESTIGATING INTERACTIONS OF ENERGETIC ATOMIC OXYGEN WITH SOLIDS

Graham S. Arnold and Daniel R. Peplinski *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 150-168 refs Sponsored in part by the Aerospace Research Program (For primary document see N84-34468 24-18)

Avail: NTIS HC A13/MF A01 CSCL 20H

N84-34484*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THE ENERGY DEPENDENCE AND SURFACE MORPHOLOGY OF KAPTON (TRADEMARK) DEGRADATION UNDER ATOMIC OXYGEN BOMBARDMENT

Dale C. Ferguson *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 205-221 refs (For primary document see N84-34468 24-18)

Avail: NTIS HC A13/MF A01 CSCL 20H

N84-34485*# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.

ATOMIC BEAM SYSTEM FOR LABORATORY SIMULATION OF UPPER ATMOSPHERE OXYGEN ATOM IMPACT ON STS SURFACES

P. Mahadevan *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 222-227 (For primary document see N84-34468 24-18)

Avail: NTIS HC A13/MF A01 CSCL 20H

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

No abstracts in this category.

74 OPTICS

Includes light phenomena.

N84-35093 Department of the Navy, Washington, D. C.
FREQUENCY INDEPENDENT ACOUSTIC ANTENNA Patent
R. L. Sternberg, inventor (to Navy) Issued 24 Apr. 1984 7 p Supersedes AD-D004330
(AD-D011194; US-Patent-4,445,207; US-Patent-Appl-SN-784186; US-Patent-Class-367-150) Avail: US Patent and Trademark Office CSCL 20/1

A frequency independent log periodic acoustic device is utilized for the transmission or reception of underwater sound. The acoustic device when used in conjunction with any substantially plane wave receiving or transmitting transducer produces a directional, substantially constant beamwidth diffraction pattern for radiation or reception of underwater sound signals. A key element of the device is a particularly shaped plate or diaphragm, called a filter plate, made of stainless steel or other material having suitable acoustic properties. The filter plate on being placed in front of any plane wave receiving or transmitting transducer acts automatically to make the beamwidth of the diffraction pattern of the combined device constant, regardless of frequency. GRA

N84-35094 Department of the Navy, Washington, D. C.
GATED FIBER OPTIC TRANSMISSION Patent
L. C. Bobb, inventor (to Navy) Issued 8 May 1984 5 p Supersedes AD-D010331
(AD-D011197; US-Patent-4,447,117; US-Patent-Appl-SN-395557; US-Patent-Class-350-96.15) Avail: US Patent and Trademark Office CSCL 20/6

A gated fiber optic sensor system is disclosed for increasing the effective optical path of a length of optical fiber cable. A pulse of polarized light having a known optical wavelength is directed into a length of optical fiber cable for propagation therethrough in a cyclic path. A planar semiconductor member is mounted in the path of the polarized light pulse at the Brewster angle to permit continuous transmission of the polarized light pulse through the cable until a light pulse of a second optical wavelength is made to impinge upon the semiconductor member, changing the reflectivity characteristics thereof and causing the polarized pulse to be extracted from its cyclic path for detection and processing. In one preferred embodiment, the optical fiber cable is configured in a loop to provide the cyclic path for the polarized light pulse, while in another preferred embodiment, the pulse path is provided by a straight section of optical fiber cable forming a part of a highly reflective cavity having reflectors on either end. Author (GRA)

N84-35095# Weapons Systems Research Lab., Salisbury (Australia).
LARGE DIAMETER OPTICAL SLIP-RINGS
P. J. Buttery Defence Research Centre Nov. 1983 25 p
(WSRL-0342-TM; AR-003-729) Avail: NTIS HC A02/MF A01

Two different types of optical slip-rings developed for use with a rotating platform which has a column diameter of 123 mm are described. The preferred type is then combined with an on-axis coupling for use on an experimental track-while-scan secondary radar system. R.S.F.

N84-35096# Michigan Univ., Ann Arbor. Dept. of Electrical and Computer Engineering.
WHITE LIGHT OPTICAL INFORMATION PROCESSING Annual Report, 15 Aug. 1982 - 30 Sep. 1983
E. N. Leith Feb. 1984 41 p
(Grant AF-AFOSR-0243-81)
(AD-A144142; AFOSR-84-0608TR; AR-6) Avail: NTIS HC A03/MF A01 CSCL 20/6

Methods for optical processing and holography with light of reduced coherence are described. Specifically described are: (1) a method for making holographic optical elements in light of reduced spatial coherence; (2) a method for doing real time phase conjugation in light of reduced spatial coherence; and (3) a method for doing off-axis Fourier transform holography in spatially incoherent light. Author (GRA)

N84-35097# Utah State Univ., Logan.
DESIGN STUDY OF ION ANTI-CONTAMINATION SYSTEM Scientific Report, 1 Jul. - 30 Nov. 1983
W. K. Wong Hanscom AFB, Mass. AFGL 7 Mar. 1984 116 p Prepared in cooperation with SSG, Inc., Waltham, MA
(Contract F19628-83-C-0056)
(AD-A144197; SDL/84-014; AFGL-TR-84-0086; SR-2) Avail: NTIS HC A06/MF A01 CSCL 20/6

Cryogenically cooled, high straylight rejection, infrared sensors are currently planned for use in space surveillance applications. An investigative study was made to determine the optical contamination problem of these sensors during a 4-year mission duration and the feasibility of designing an anticontamination system that can be adapted to these sensors. The optical contamination problem is the increase in optical scatter of the telescope primary mirror due to cryodeposits of atomic oxygen (external) and water vapor (self generated), and particulate contamination (self generated). At sensor altitude of 1,000 km the atomic oxygen cryodeposit on the mirror, accumulated over 4 years of mission life, may be a factor of 100 higher than what is considered manageable. GRA

N84-35098# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ATMOSPHERIC REFRACTION ERROR AND ITS COMPENSATION FOR PASSIVE OPTICAL SENSORS
K. P. Dunn 4 Jun. 1984 43 p
(Contract F19628-80-C-0002)
(AD-A144377; TR-686; ESD-TR-84-015) Avail: NTIS HC A03/MF A01 CSCL 04/1

A wide range of passive optical sensor applications often require the sensor to operate within the atmosphere while the objects it examines are outside the atmosphere. The refraction of light by the Earth's atmosphere becomes a significant error source when the objects are at low elevation angle. When the measurement accuracy at low elevation angle is important for the sensor application, an accurate refraction compensation scheme is needed. In this report, we provide an algorithm that will compensate the error when the object is at a finite range from the sensor. Sensitivities of compensation errors to object range error, atmospheric model mismatch, and possible statistical variations about a given atmospheric model are also provided. Author (GRA)

N84-35099# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
COMPUTER AIDED GEOMETRICAL OPTICS DESIGN M.S. Thesis
D. J. Tipple Dec. 1983 123 p
(AD-A144559; AFIT/GEP/PH/83D-14) Avail: NTIS HC A06/MF A01 CSCL 20/6

The purpose of this thesis was to employ the FALCON optical design computer program to accomplish the design and analysis of a complex optical system. To this end, a working knowledge of the code, its capabilities, its limitations, and of optical design techniques were all gained. The FALCON optical design and evaluation computer program was examined and applied to two efforts. The first effort involved the evaluation of a Cooke triplet and manual verification of some of the code's results. The

second effort was the design of a beam expander, the function of which is to expand and square a high aspect ratio rectangular laser beam. The system uses a single spherical mirror and two cylindrical mirrors to produce the desired output. A brief discussion of the diffraction theory of aberrations and aberration balancing gives some of the basis upon which the FALCON code is constructed. GRA

N84-35099# Rome Air Development Center, Griffiss AFB, N.Y.
ANALYTIC MODELS FOR RADIATION INDUCED LOSS IN OPTICAL FIBERS I
J. A. Wall Apr. 1984 14 p
(AF Proj. 2306)
(AD-A144630; RADC-TR-84-71) Avail: NTIS HC A02/MF A01 CSCL 18/5

Analytic models to describe the radiation induced loss in optical fibers as a function of dose were sought. A simple power-law function was tried, and it was found to give excellent to good fits to data on 25 fibers having a wide range of radiation sensitivities. Using this function, only 2 empirical constants are needed to calculate the radiation induced loss in optical fiber. This is useful in categorizing the radiation hardness of optical fibers and in systems design. Author (GRA)

N84-35101# IBM Research Lab., San Jose, Calif.
PULSED PHOTOTHERMAL RADIOMETRY FOR NONCONTACT SPECTROSCOPY, MATERIAL TESTING AND INSPECTION MEASUREMENT
A. C. Tam 8 Aug. 1984 29 p
(Contract N00014-83-C-0170)
(AD-A144640; RJ-4392; TR-11) Avail: NTIS HC A03/MF A01 CSCL 20/6

Photothermal Radiometry (PTR) is a sensitive technique for noncontact spectroscopy and inspection. Its principle is the following: a modulated beam of photons (or other particles) produces temperature transients in a sample; the corresponding transients in the infrared thermal radiation emitted from the sample are analyzed. This can provide absolute absorption coefficients, as well as information on thermal diffusivity, layered structure, and dimensions. Variations of PTR are possible with continuously-modulated or pulsed excitation, and with transmission or back-scattering detection. These variations are reviewed. The recent technique of pulsed PTR with backscattering detection is described in more detail, and some important single-ended remote sensing applications are discussed. Author (GRA)

N84-35102# International Centre for Theoretical Physics, Trieste (Italy).
OPTICAL PROPERTIES OF AMORPHOUS SILICON: SOME PROBLEM AREAS
N. M. Ravindra, F. DeChelle (Universite des Sciences et Techniques du Languedoc), C. Ance (Universite des Sciences et Techniques du Languedoc), J. P. Ferraton (Universite des Sciences et Techniques du Languedoc), J. M. Berger (Universite des Sciences et Techniques du Languedoc), and S. P. Coulibaly (Universite des Sciences et Techniques du Languedoc) Aug. 1983 15 p refs (DE84-701201; IC-83/136) Avail: NTIS HC A02/MF A01

Problem areas concerning the various optical properties of amorphous silicon are addressed. The problems seem to emerge from the classical methods employed to determine the optical properties like the optical gap, urbach tail parameter, and other related characteristics. Additional proteins emerged in recent years by virtue of many attempts to generalize the property behavior relationships for amorphous silicon without attributing any importance to the method of preparation of the films. Disorder is generally thought to be the controlling parameter yet at least for films containing large concentrations of hydrogen, the hydrogen concentration has an equally important role to play. Films prepared by glow discharge and clerical vapor deposition were investigated. R.S.F.

N84-34638# Joint Publications Research Service, Arlington, Va.
THOMSON DEVELOPS NEW OPTICAL READER, DIGITAL SWITCHING SYSTEM: GIGADISC READER RECORDER
D. Levy *In its* Worldwide Rept.: Telecommun. Policy, Res. and Develop. (JPRS-TTP-84-002) 16 Jan. 1984 p 71-73 refs Transl. into ENGLISH from Electron. Actualities (Paris), 25 Nov. 1983 pp 1, 6 (For primary document see N84-34634 24-31)
Avail: NTIS HC A05/MF A01

N84-34785# Materials Research Labs., Melbourne (Australia).
DEVELOPMENT OF TEXTURE DESCRIPTIONS FOR IMAGES
C. J. Woodruff *In its* Extracts from Symp.: Countersurveillance 1983 May 1984 p 42-47 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34786# Weapons Systems Research Lab., Adelaide (Australia). Weapon Systems Div.
AUTONOMOUS SURVEILLANCE IN THE VISUAL SPECTRAL REGION
B. E. Furby and B. D. Roney *In* Materials Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 48-68 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34788# Electronics Research Lab., Adelaide (Australia).
OPTICAL PROCESSING, ITS ROLE IN SURVEILLANCE
D. G. Nichol *In* Materials Research Labs. Extracts from Symp.: Countersurveillance 1983 May 1984 p 69-72 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34789# Materials Research Labs., Melbourne (Australia).
TWO APPROACHES TO THE INSTRUMENTAL ESTIMATION OF DETECTABILITY
D. R. Skinner and P. J. Beckwith *In its* Extracts from Symp.: Countersurveillance 1983 May 1984 p 94-98 refs (For primary document see N84-34779 24-43)
Avail: NTIS HC A09/MF A01

N84-34934# White Sands Missile Range, N.Mex.
EVALUATION OF OPTICAL DATA COLLECTION INSTRUMENTATION IN THE DESERT ENVIRONMENT
R. A. Dragon *In* ARO Proc. of the 29th Conf. on the Design of Expt. in Army Res., Develop. and Testing Jun. 1984 p 167-171 (For primary document see N84-34927 24-59)
(AD-P003847) Avail: NTIS HC A17/MF A01 CSCL 20/6

N84-35216# Milan Univ. (Italy). Dipt. di Fisica.
PRELIMINARY RESULTS OF COORDINATED OPTICAL UV AND X-RAY OBSERVATIONS OF MAGNETIC WHITE DWARFS IN BINARIES
L. Maraschi, K. Beuermann (Technische Universitaet, Berlin), J. M. Bonnet-Bidaud (Centre d'Etudes Nucleaires, Saclay, France), P. A. Charles (Oxford University), L. Chiappetti (ESOC, Darmstadt, West Germany), G. Hammerschlag (Astronomical Institute, Amsterdam), I. D. Howarth (University College, London), C. Motch (Observatoire de Besancon, France), M. Mouchet (Observatoire de Paris-Meudon, France), J. Osborne (ESOC, Darmstadt, West Germany) et al *In* ESA 4th European IUE Conf. Jul. 1984 p 427-430 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N84-35103# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
NONLINEAR EFFECTS IN ELECTRON CYCLOTRON RESONANCE HEATING OF PLASMAS
Abraham C.-L. Chian Aug. 1984 13 p refs Presented at the

4th Japan-Brazil Symp. on Sci. and Technol., Aug. 1984
(INPE-3233-PRE/583) Avail: NTIS HC A02/MF A01

Mode conversion of an extraordinary wave into an upper hybrid wave is a possible mechanism through which plasmas are heated near the electron cyclotron frequency. At the resonant layer where the mode conversion takes place it is possible for the electrostatic field to attain a very large value. The ponderomotive force associated with this large amplitude upper hybrid wave is capable of giving rise to a variety of nonlinear effects. Cavitons can be generated through nonlinear coupling of upper hybrid envelope solitons with low frequency lower hybrid, electrostatic ion cyclotron or magnetoacoustic waves. Author

N84-35104# Materials Research Labs., Melbourne (Australia). Physical Chemistry Div.
RAILGUN PLASMA ARMATURE CHARACTERISATION EXPERIMENTS
D. D. Richardson May 1984 28 p refs
(MRL-R-928; AR-003-910) Avail: NTIS HC A03/MF A01

A plasma armature characterization experiment (PACE) is described. The PACE device is designed to study the plasma armature of railguns and yields information on properties such as temperature, pressure, densities, plasma potential, and ion species with their degrees of ionization. The main experimental studies are by spectroscopy of the light emitted and by Langmuir probes. The device simulates the plasma moving behind the projectile in a railgun by a static plasma held by electromagnetic forces against a fixed wall. Results to date demonstrate the feasibility of the concept and indicate improvements to the device which ensure that much useful information on railgun plasmas is forthcoming. Author

N84-35105# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PLASMA HEATING, CONFINEMENT AND STABILIZATION EXPERIMENTS IN AXISYMMETRIC MIRROR-CUSP DEVICE
S. Okamura, R. Kumazawa, K. Adati, T. Aoki, H. Fujita, K. Hattori, S. Hidekuma, T. Kawamoto, Y. Okubo, and T. Sato Aug. 1984 17 p refs Presented at the IAEA 10th Intern. Conf. on Plasma Phys. and controlled Thermonucl. Fusion Res., London, 1984 Sponsored in part by DOE
(IPPJ-690) Avail: NTIS HC A02/MF A01

Experimental results of ICRH plasma production, RF plugging, and ambipolar potential plugging in RFC-XX-M are described. Results of ICRF heating and RF stabilization in HIEI are also described. The mechanism of RF stabilization for magnetohydrodynamic mode was clarified. R.S.F.

N84-35106*# National Aeronautics and Space Administration, Washington, D. C.
MEASUREMENT AND EVALUATION OF ARC CHARACTERISTICS (Ar,N2)
H. Maecker Aug. 1984 18 p refs Transl. into ENGLISH from Z. fuer Phys. (West Germany), v. 158, 1960 p 392-404 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77507; NAS 1.15:77507) Avail: NTIS HC A02/MF A01 CSCL 20I

The field strength/current intensity characteristics of cylindrical arcs depend on the electrical conductivity sigma as a function of the thermal flux potential S = integral (LIMITS T,O) x dT (x = thermal conductivity coefficient) of the arc gas, as was discussed in the previous publication. This means that these important gas properties can be determined from the arc characteristics. The required evaluation procedure is derived based on the relationship given above and is applied to measurements of a nitrogen arc. For accurate measurements of the arc characteristic, the cascade arc was developed further, where the tube is formed for the arc by water-cooled and centrally penetrated Cu-plates. This meant that 10 kW/cm arc columns could be used and in this way a higher degree of ionization was guaranteed. The results of this investigation are the characteristics of Ar and N2 the sigma (s) curve of N2 and finally the radiation density u(sigma) for N2. S.B.

N84-35107*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PHYSICS OF NONMAGNETIC RELATIVISTIC THERMAL PLASMAS Ph.D. Thesis - Calif. Univ., San Diego
Charles Dennison Dermer Jul. 1984 161 p refs
(NASA-TM-86154; NAS 1.15:86154) Avail: NTIS HC A08/MF A01 CSCL 20I

A detailed treatment of the kinematics of relativistic systems of particles and photons is presented. In the case of a relativistic Maxwell-Boltzmann distribution of particles, the reaction rate and luminosity are written as single integrals over the invariant cross section, and the production spectrum is written as a double integral over the cross section differential in the energy of the produced particles (or photons) in the center-of-momentum system of two colliding particles. The results are applied to the calculation of the annihilation spectrum of a thermal electron-positron plasma, confirming previous numerical and analytic results. Relativistic thermal electron-ion and electron-electron bremsstrahlung are calculated exactly to lowest order, and relativistic thermal electron-positron bremsstrahlung is calculated in an approximate fashion. An approximate treatment of relativistic Comptonization is developed. The question of thermalization of a relativistic plasma is considered. A formula for the energy loss or exchange rate from the interaction of two relativistic Maxwell-Boltzmann plasmas at different temperatures is derived. Application to a stable, uniform, nonmagnetic relativistic thermal plasma is made. Comparison is made with other studies. Author

N84-35108# Artec Associates, Inc., Hayward, Calif.
PRELIMINARY DESIGN OF A REUSEABLE PPMHD (PULSED PLASMA MHD) POWER SUPPLY TEST BED FACILITY Final Report, 19 Sep. 1983 - 31 May 1984
S. P. Gill, W. L. Shimmin, and J. D. Watson May 1984 66 p
(Contract DASG60-83-C-0112)
(AD-A144147; FR-188) Avail: NTIS HC A04/MF A01 CSCL 14/2

This report describes a preliminary design of a reuseable pulsed plasma magnetohydrodynamic, (PPMHD) power supply test bed facility that operates in the gigawatt/megajoule regime. The current status of PPMHD component technologies is described as a basis for present and future hardware designs. This includes a discussion of an approach to self-excited operation which is an extension of demonstrated component technologies. Size scaling relations are presented for estimating PPMHD power supply weights in terms of electrical output power and energy. Author (GRA)

N84-35109# Naval Postgraduate School, Monterey, Calif.
SHORT-PULSE LASER AND PLASMA SURFACE INTERACTIONS
F. Schwirzke Apr. 1984 19 p
(AD-A144536; NPS-61-84-004) Avail: NTIS HC A02/MF A01 CSCL 20/5

Unipolar arcing has been shown to be the primary plasma surface interaction process when a laser produced plasma is in contact with a surface. Evidence of unipolar arcing was found on targets irradiated with neodymium laser pulses of 5 ns duration. The burn pattern of a defocused low irradiance laser pulse consists exclusively of unipolar arc craters. No other damage is observable. Author (GRA)

N84-35110# Air Force Weapons Lab., Kirtland AFB, N. Mex.
PLASMA CONDUCTIVITY EXPERIMENTS ON PULSED HIGH-VOLTAGE DISCHARGES BY TWO COIL RF-PROBE Final Report, Dec. 1982 - Jul. 1983
K. J. Hendricks, M. C. Clark, D. J. Ulrich, and L. K. Len Jul. 1984 38 p
(AF Proj. 5797)
(AD-A144595; AFWL-TR-84-06) Avail: NTIS HC A03/MF A01 CSCL 20/9

Experiments directly measuring the plasma conductivity have been done on pulsed, high voltage discharges. The channel conductivity was measured by a two coil RF-probe and verified using conventional collecting Langmuir probes. The conductivity

measured by these two methods agrees very well. These experiments also demonstrate the potential for the two coil RF-probe to yield useful data in intense electron beam environments. GRA

N84-35111# International School for Advanced Studies, Trieste (Italy).
THEORY OF THE INTERFACE BETWEEN A CLASSICAL PLASMA AND A HARD WALL
P. Ballone, G. Pastore, and M. P. Tosi (International Centre for Theoretical Physics) Sep. 1983 17 p refs
(DE84-701221; IC-83/150) Avail: NTIS HC A02/MF A01

The interfacial density profile of a classical one-component plasma confined by a hard wall is studied in planar and spherical geometries. The approach adapts to interfacial problems a modified hypernetted-chain approximation developed by Lado and by Rosenfeld and Ashcroft for the bulk structure of simple liquids. The specific new aim is to embody selfconsistently into the theory a contact theorem, fixing the plasma density at the wall through an equilibrium condition which involves the electrical potential drop across the interface and the bulk pressure. The theory is brought into fully quantitative contact with computer simulation data for a plasma confined in a spherical cavity of large but finite radius. The interfacial potential at the point of zero charge is accurately reproduced by suitably combining the contact theorem with relevant bulk properties in a simple, approximate representation of the interfacial charge density profile. Author

N84-35211*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for Astronomy and Solar Physics.
OPTICALLY-THICK, HIGHLY-VARIABLE PLASMA IN INTERACTING BINARIES
Yoji Kondo, George E. McCluskey (Lehigh University), and Sidney B. Parsons (Space Telescope Science Institute) *In* ESA 4th European IUE Conf. Jul. 1984 p 409-410 refs (For primary document see N84-35135 24-88)
(Grant NSG-5386)
Avail: NTIS HC A23/MF A01 CSCL 20I

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N84-35112*# National Aeronautics and Space Administration. Pasadena Office, Calif.
EPITAXIAL THINNING PROCESS Patent
Clifford M. Siegel, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 31 Jul. 1984 8 p Filed 6 Apr. 1982 Supersedes N82-26397 (20 - 17, p 2371) Sponsored by NASA
(NASA-Case-NPO-15786-1; US-Patent-4,462,871;
US-Patent-Appl-SN-366103; US-Patent-Class-204-1T;
US-Patent-Class-204-56R; US-Patent-Class-204-37.6;
US-Patent-Class-324-158D; US-Patent-Class-324-158T) Avail: US Patent and Trademark Office CSCL 20L

A method is described for thinning an epitaxial layer of a wafer that is to be used in producing diodes having a specified breakdown voltage and which also facilitates the thinning process. Current is passed through the epitaxial layer, by connecting a current source between the substrate of the wafer and an electrolyte in which the wafer is immersed. When the wafer is initially immersed, the voltage across the wafer initially drops and then rises at a steep rate. When light is applied to the wafer the voltage drops, and when the light is interrupted the voltage rises again. These changes in voltage, each indicate the breakdown voltage of a Schottky diode that could be prepared from the wafer at that time. The epitaxial layer is thinned by continuing to apply current through the wafer while it is immersed and light is applied, to form an oxide film and when the oxide film is thick the wafer can then be cleaned of oxide and the testing and thinning continued. Uninterrupted thinning can be achieved by first forming an oxide film, and then using an electrolyte that dissolves the oxide about as fast as it is being formed, to limit the thickness of the oxide layer.

Official Gazette of the U.S. Patent and Trademark Office

N84-35113* National Aeronautics and Space Administration. Pasadena Office, Calif.
PROCESS AND APPARATUS FOR GROWING A CRYSTAL RIBBON Patent
Jay W. Thornhill, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 4 Sep. 1984 13 p Filed 23 Apr. 1982 Supersedes N82-26779 (17 - 20, p 2426) Sponsored by NASA
(NASA-Case-NPO-15629-1; US-Patent-4,469,552;
US-Patent-Appl-SN-371351; US-Patent-Class-156-608;
US-Patent-Class-156-617-SP; US-Patent-Class-156-617-V;
US-Patent-Class-156-DIG.64; US-Patent-Class-156-DIG.88;
US-Patent-Class-156-DIG.96; US-Patent-Class-422-246;
US-Patent-Class-422-249) Avail: US Patent and Trademark Office CSCL 20B

A process and apparatus is disclosed for growing a crystal ribbon of a substance of theoretically infinite length from a melt of the substance. A pair of fixedly positioned edge defining members are partially submerged into the melt so as to break the surface of the melt at a predetermined distance from one another. The edge defining members are wettable by the melt and the predetermined distance substantially corresponds to the width of the crystal ribbon to be grown. The crystal ribbon is grown by contacting the surface of the melt with a seed ribbon between the edge defining members whereby a meniscus of the melt is established on the seed ribbon. The meniscus is stabilized by the meniscus of the melt on the edge defining members. Pulling the seed crystal ribbon away from the melt results in continuous growth of the crystal ribbon.

Official Gazette of the U.S. Patent and Trademark Office

N84-35114 Department of the Navy, Washington, D. C.
CHEMICAL ETCHING OF TRANSFORMED STRUCTURES Patent
M. E. Aklufi, inventor (to Navy) 22 May 1984 6 p
(AD-D011188; US-Patent-4,450,041;
US-Patent-Appl-SN-390458-82) Avail: US Patent and Trademark Office CSCL 09/5

A maskless technique is disclosed for shaping semiconductor materials by forming areas that are selectively etchable with respect to the rest of the structure. In one embodiment of this invention, a body of amorphous material is subjected to radiation by a focused energy beam so as to convert a predetermined region of the amorphous material into a region of crystalline material. The converted region etches at a slower rate than the non-converted amorphous material. GRA

N84-35115# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
IMPURITY CLUSTER STATES IN DISORDERED 2-DIMENSIONAL SYSTEMS: A SELF-CONSISTENT HARTREE-FOCK-ROOTHAAN MODEL
A. Ferreira daSilva and M. Fabbri Aug. 1984 18 p refs Submitted for publication
(INPE-3223-PRE/574) Avail: NTIS HC A02/MF A01

The microscopic structure of the impurity states in a two dimensional disordered system was investigated by using a self consistent Hartree-Fock-Roothaan formalism with spin polarized potentials which was previously used to study the three dimensional systems. It is shown that all the matrix elements are very sensitive to a change in the dimensionality of the system. For impurity concentration in a large range of interest, the electronic states are localized and the system is dominated by isolated or pair of donor impurities. The results of other models are discussed.
Author

N84-35116# Massachusetts Inst. of Tech., Cambridge. National Magnet Lab.

SYNTHESIS AND CHARACTERIZATION OF SUPERCONDUCTING ELECTRONIC MATERIALS Semiannual Technical Report, 1 Jul. - 31 Dec. 1983
R. H. Meservey, P. M. Tedrow, and T. P. Orlando 15 Feb. 1984 9 p
(Contract F49620-82-K-0028)
(AD-A144137; AFOSR-84-0630TR) Avail: NTIS HC A02/MF A01 CSCL 20/3

Films of VN as thin as 5 nm have been made by nitriding V films at high temperature. Tunnel junctions have been successfully made using both oxidized and nitrided amorphous Si barriers. Spin-polarized tunneling results show VN to have a small spin-orbit interaction, but larger than Al. Tunnel junctions have been successfully made on V3Ga and spin-polarized tunneling shows spin splitting up to 20 Teslas. Structure and compositional analysis of the V3Ga films has been carried out. We have successfully made high transition temperature Nb films as thin as 5 nm. GRA

N84-35117# Westinghouse Research and Development Center, Pittsburgh, Pa.
INVESTIGATION OF THE MBE GROWTH OF InSb AND NOVEL QUANTUM WELL STRUCTURES Progress Report, Oct. 1983 - Mar. 1984
R. F. C. Farrow 27 Apr. 1984 7 p
(Contract N00014-83-C-0617)
(AD-A144151) Avail: NTIS HC A02/MF A01 CSCL 20/2

The prime objectives of this contract are twofold: (1) the preparation and characterization of InSb/CdTe interfaces to investigate the existence of a two dimensional electron gas confined in the InSb by the interface potential; (2) the preparation and characterization of InSb films grown onto lattice-matched CdTe substrates. In this period, the reproducible preparation of high purity, high perfection CdTe films on ion-cleaned InSb substrates and on InSb buffer layers on InSb substrates has been achieved. The techniques of cross-section transmission transmission electron microscopy (XTEM), double crystal X-ray rocking curve analysis (DCRC), He(+) ion channeling, photoluminescence, far infrared magneto-absorption and C-V profiling have been used to study the CdTe film and interface properties. GRA

N84-35118# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ELECTRONIC PROPERTIES OF GRAIN BOUNDARIES IN GaAs: A STUDY OF ORIENTED BICRYSTALS PREPARED BY EPITAXIAL LATERAL OVERGROWTH
J. P. Salerno, J. C. C. Fan, R. W. McClelland, P. Vohl, and J. G. Mavroides 10 May 1984 191 p
(Contract F19628-80-C-0002)
(AD-A144358; TR-669; ESD-TR-83-066) Avail: NTIS HC A09/MF A01 CSCL 20/2

The electronic properties of grain boundaries in GaAs have been investigated. The optoelectronic properties of melt-grown polycrystalline GaAs were studied by cathodoluminescence. This analysis showed that grain boundary properties are influenced by both the boundary structure and the composition of the matrix. For a systematic investigation of the relationship between grain boundary structure and electronic behavior, a technique has been developed for the growth of oriented GaAs bicrystal layers by vapor-phase epitaxy using lateral overgrowth. Using this technique, a series of n-type bicrystal layers containing 110/(111) tilt boundaries with selected misorientation angles ranging from 0 to 30 degrees were grown. GRA

N84-35119# Stanford Univ., Calif. Center for Materials Research.
RESEARCH AND CRYSTAL GROWTH ON HIGH DIELECTRIC CONSTANT MATERIALS FOR mm WAVE APPLICATIONS Annual Technical Report
R. S. Feigelson and D. Elwell Jul. 1984 13 p
(Contract N00014-82-K-0266)
(AD-A144412; SU-CMR-84-4) Avail: NTIS HC A02/MF A01 CSCL 20/12

This program has as its major aim the growth of single crystals of ferroelectric materials for mm wave device applications. The material requirements for this application are a high dielectric constant and low losses. Large non-linear effects are associated with ferroelectric materials operated in the temperature range just above or just below the Curie point Tc, and materials such as BaTi03 and KTN have been evaluated for possible applications in phase shifters and other devices in the mm waveband. GRA

N84-35120# IBM Research Lab., San Jose, Calif.
PHOTOTHERMAL ANALYSIS OF THIN FILMS
H. Coufal and P. Hefferle 10 Aug. 1984 8 p
(Contract N00014-81-C-0418)
(AD-A144472; TR-9) Avail: NTIS HC A02/MF A01 CSCL 20/13

Applications of photothermal depth profiling are described. Most recent results demonstrate the use of thermal delay lines and multiplex techniques. Author (GRA)

N84-35121# New Orleans Univ., La.
ZEEMAN STUDIES OF SHALLOW DONORS AND EXCITONS IN QUANTUM WELLS Final Report, 1 May 1983 - 29 Feb. 1984
R. L. Greene Mar. 1984 25 p
(Grant AF-AFOSR-0120-83)
(AD-A144487; AFOSR-84-0627TR) Avail: NTIS HC A02/MF A01 CSCL 20/10

A theoretical study has been made of the shallow donor and Wannier exciton within a one-dimensional quantum well. The variational method was used with a cylindrical Gaussian basis set. In order to facilitate comparison with future experimental measurements of excited states of these systems, an external magnetic field was assumed perpendicular to the interfaces between the barrier material and the well. Calculations reveal that the choice of matching conditions used at the interfaces has little effect on the binding energies of the ground or first few excited states of the shallow donor, except for well widths considerably smaller than the effective Bohr radius. The results of calculations of the shallow donor ground and first few excited states are presented for a variety of well sizes and magnetic field strengths. Similar results are given for the ground state of the Wannier exciton. Author (GRA)

N84-35122# International Centre for Theoretical Physics, Trieste (Italy).
ELEMENTARY EXCITATIONS AND QUASI-TWO-DIMENSIONAL BEHAVIOUR IN A GaAs FIELD EFFECT TRANSISTOR
M. Tomak, B. E. Sernelius (Linkoeping Univ.), and K.-F. Berggren (Linkoeping Univ.) Sep. 1983 12 p refs Submitted for publication
(DE84-701190; IC-83/154) Avail: NTIS HC A02/MF A01

The elementary excitation modes in a narrow channel of conducting electrons in a special GaAs FET are evaluated within the random phase approximation. The system is found to be quasi-two-dimensional when the width of the channel is small, i.e. there are collective excitations with a dispersion very close to the strictly two-dimensional form. In addition to the lowlying quasi-two-dimensional mode, there are higher collective modes associated with the sub-band structure of the device. Author

N84-35123# International Centre for Theoretical Physics, Trieste (Italy).
IMPURITY STATES IN THE PRESENCE OF AN INTERFACE
V. E. Godwin and M. Tomak Sep. 1983 10 p refs
(DE84-701192; IC-83/158) Avail: NTIS HC A02/MF A01

A modification of the effective mass approximation in the ShamNakayama approach is discussed. Binding energies are calculated as functions of electric field, scattering length and distance of impurities localized at the interface between S1O2 and an n-type inversion layer on S1(001). Author

N84-34646# Joint Publications Research Service, Arlington, Va.
SWEDISH FIRM FIRST IN SCANDINAVIA TO MASTER GaAs TECHNOLOGY
Ingvor vanGinhoven *In its* West Europe Rept.: Sci. and Technol.

No. 157 (JPRS-84434) 29 Sep. 1983 p 13-18 Transl. into ENGLISH from NY Teknik (Stockholm), 4 Aug. 1983 p 12-13 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

No abstracts in this category.

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N84-35124*# National Aeronautics and Space Administration, Washington, D. C.
STUDY OF ANNOYANCE DUE TO URBAN AUTOMOBILE TRAFFIC. ANNEX 5: SOCIOLOGICAL STUDY
D. Aubree, S. Auzou, and J. M. Rapin Jul. 1984 79 p Transl. into ENGLISH of "Etude de la Gene due au Trafic Automobile Urbain, Annex 5, Etude Sociologique" Centre Scientifique et Technique dy Batiment, Paris, Jun. 1971 p 415-499 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77515; NAS 1.15:77515) Avail: NTIS HC A05/MF A01 CSCL 05K

The aim, method, description, and results of the study of the influence of traffic noise on the annoyance of persons living near points of measurement are discussed. A facsimile of the questionnaire used in the study is included. The essential themes were: the different dimensions of annoyance; the means of defense against noise; the criteria subjects use to describe the noise; attitudes regarding noise; and the functions of noises. S.B.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N84-35125# Paris V Univ. (France). Inst. de Psychologie.
MANAGERIAL AND ORGANIZATIONAL DETERMINANTS OF EFFICIENCY IN RESEARCH TEAMS (SOCIAL SCIENCES) Final Report
C. Levy-Leboyer May 1984 107 p In ENGLISH and FRENCH
(Contract DAJA37-81-C-0286; DA Proj. 2Q1-61102-B-74-D)
(AD-A144153; ARI-RN-84-75) Avail: NTIS HC A06/MF A01 CSCL 05/1

This research explores the generalizability of the conclusions reached in a previous survey on biomedical research. Various possibilities for a success index in Social Sciences are discussed. The diversity of the heuristic processes in the Social Sciences are described as well as the variety of leadership styles.
Author (GRA)

N84-35126# National Science Foundation, Washington, D.C. Directorate for Engineering.
REPORT OF THE INFORMATION TECHNOLOGY WORKSHOP
R. F. Cotellessa 1 Oct. 1983 162 p
(AD-A144212) Avail: NTIS HC A08/MF A01 CSCL 05/1

The U.S. position of leadership in information technology is being challenged as never before. The central question that capsules the purpose of the Workshop is: What areas of research are most important to sustain the vitality of this crucial sphere of national life - with consequences for the economy and national security? The effort, reported herein, addressed the following six topical areas in as much depth as possible: Artificial Intelligence; Distributed Computing and Networking; Highly Parallel Computing; Information Science; Research in Support of Some Major Use Areas; and Robotics. GRA

N84-34647# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON PHILIPS R AND D STRATEGY, POLICIES, MAJOR EFFORTS
Claude Amalric *In its* West Europe Rept.: Sci. and Technol. No. 157 (JPRS-84434) 29 Sep. 1984 p 19-36 Transl. into ENGLISH from Lusine Nouvelle (Paris), 30 Jun. 1983 p 62-69 (For primary document see N84-34645 24-31)
Avail: NTIS HC A04/MF A01

N84-34716# European Space Agency, Paris (France).
ESA AND ITS PROGRAMS: PRESENT AND FUTURE
E. Mallett *In its* Space Laser Appl. and Technol. (SPLAT) May 1984 3 p (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-34717# European Space Research and Technology Center, Noordwijk (Netherlands).
THE ESA TECHNOLOGICAL RESEARCH PROGRAMS
M. Trella *In* ESA Space Laser Appl. and Technol. (SPLAT) May 1984 4 p (For primary document see N84-34715 24-36)
Avail: NTIS HC A14/MF A01

N84-35054# National Science Council, Taipei (Taiwan).
AN ALTERNATIVE MATHEMATICAL APPROACH TO MOVEMENT AS COMPLEX HUMAN BEHAVIOR Abstract Only
Hsiao-Fan Wang (ITRI) *In its* Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 441-442 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N84-35127*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEOCODED DATA STRUCTURES AND THEIR APPLICATIONS TO EARTH SCIENCE INVESTIGATIONS
Michael Goldberg Jun. 1984 31 p refs
(NASA-TM-86113; NAS 1.15:86113) Avail: NTIS HC A03/MF A01 CSCL 05B

A geocoded data structure is a means for digitally representing a geographically referenced map or image. The characteristics of representative cellular, linked, and hybrid geocoded data structures are reviewed. The data processing requirements of Earth science projects at the Goddard Space Flight Center and the basic tools of geographic data processing are described. Specific ways that new geocoded data structures can be used to adapt these tools to scientists' needs are presented. These include: expanding analysis and modeling capabilities; simplifying the merging of data sets from diverse sources; and saving computer storage space.
S.B.

N84-35128*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A GENERAL SCIENTIFIC INFORMATION SYSTEM TO SUPPORT THE STUDY OF CLIMATE-RELATED DATA

Lloyd A. Treinish Sep. 1984 53 p refs Submitted for publication
(NASA-TM-86152; NAS 1.15:86152) Avail: NTIS HC A04/MF A01 CSCL 05B

The development and use of NASA's Pilot Climate Data System (PCDS) are discussed. The PCDS is used as a focal point for managing and providing access to a large collection of actively used data for the Earth, ocean and atmospheric sciences. The PCDS provides uniform data catalogs, inventories, and access methods for selected NASA and non-NASA data sets. Scientific users can preview the data sets using graphical and statistical methods. The system has evolved from its original purpose as a climate data base management system in response to a national climate program, into an extensive package of capabilities to support many types of data sets from both spaceborne and surface based measurements with flexible data selection and analysis functions. M.A.C.

N84-35129# RAND Corp., Santa Monica, Calif.
INFORMATION SYSTEMS: THE CHALLENGE OF THE FUTURE FOR THE AIR FORCE COMMUNICATIONS COMMAND
S. M. Drezner and W. H. Ware May 1984 18 p Presented at the Semiannual Air Force Communications Command Commanders Conference, 21 Mar. 1984, Homestead AFB, Fla.
(AD-A144277; RAND/N-2162-AF) Avail: NTIS HC A02/MF A01 CSCL 05/2

This note examines the future of the Air Force Communications Command (AFCC). It presents views based on the author's five decades of experience with the Air Force on communications, computing, and information systems matters. Because of the recent Air Force initiative that combines the career fields and corresponding organizational alignments of data automation and communications, and that assigns the entire responsibility to AFCC, the authors believe that AFCC will have to make significant changes in its posture and capability. GRA

N84-35130# Stanford Univ., Calif. Dept. of Computer Science.
APPROACHES FOR UPDATING DATABASES WITH INCOMPLETED INFORMATION AND NULLS
A. Keller and M. W. Wilkins Apr. 1984 10 p Presented at the IEEE Computer Data Eng. Conf., Los Angeles, Apr. 1984 Sponsored in part by AT/T Bell Labs. Scholarship
(Contract N00039-82-G-0250; Grant AF-AFOSR-0212-80)
(AD-A144319; AFOSR-84-0382TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

In this paper we consider approaches to updating databases containing null values and incomplete information. Our approach distinguishes between modeling incompletely known worlds and modeling changes in these worlds. As an alternative to the open and closed world assumptions, we propose the modified closed world assumption. Along with the discussion of updating, we address some issues of refining incompletely specified information. Author (GRA)

N84-35131# Naval Postgraduate School, Monterey, Calif.
COMPARATIVE ANALYSIS OF GOVERNMENT AND PRIVATE SECTOR ADP ACQUISITION M.S. Thesis
S. L. LaRue and J. M. DeLorenzo Mar. 1984 132 p
(AD-A144523) Avail: NTIS HC A07/MF A01 CSCL 05/1

This thesis has identified the primary regulatory and administrative requirements related to the acquisition of major automated information systems (AIS). In addition, case analysis was performed on current ADP projects to evaluate the application of acquisition directives to obtain pertinent cost data for model development. A baseline model was created from available data using the Interactive Financial Planning System (IRPS). This model delineates the cost elements germane to the approval and acquisition phases of the life cycle management process. This concluded the initial phase of an effort towards a comparison of government and private sector acquisition processes. Further analysis of these acquisition processes is recommended for continued model refinement, including decision support system applications. Author (GRA)

N84-35066# National Taiwan Univ., Taipei.
DESIGN AND IMPLEMENTATION OF A REENTRANT PAGE EDITING PROCESSOR Abstract Only
Chien-Ping Wu and Cheng-Yuan Hsieh *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 512 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35067# Academia Sinica, Nankang, Taipei (Taiwan).
ON EXTENDING FUNCTIONAL CAPABILITIES OF CELLULAR-LOGIC DEVICES FOR DATABASE MANAGEMENT Abstract Only
Yang-Chang Hong and Jeh-Sheng Ke *In* National Science Council Sci. Res. Abstr. in Republic of China, 1983 Jun. 1984 p 513 (For primary document see N84-35038 24-70)
Avail: Issuing Activity

N84-35226# Science Research Council, Chilton (England). Astrophysics Group.
IUE DATA REDUCTION FACILITIES ON STARLINK
Gordon E. Bromage *In* ESA 4th European IUE Conf. Jul. 1984 p 473-475 (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35227*# Computer Sciences Corp., Silver Spring, Md. Astronomy Programs.
THE NASA IUE DATA ANALYSIS FACILITIES
R. Thompson and Nancy Remage Evans *In* ESA 4th European IUE Conf. Jul. 1984 p 477-479 refs Sponsored in part by NASA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01 CSCL 05B

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N84-35132# Institute for Defense Analyses, Alexandria, Va.
OPERATING COSTS OF AIRCRAFT AND FLIGHT SIMULATORS Final Report, Feb. 1983 - Mar. 1984
J. Orlansky, M. I. Knapp, and J. String Mar. 1984 32 p
(Contract MDA903-84-C-0031)
(AD-A144241; AD-E500672; IDA-P-1733; IDA/HQ-83-25882) Avail: NTIS HC A03/MF A01 CSCL 05/9

This paper presents data and analyses of the operating costs of flight simulators and aircraft used in military training. The results should be useful in cost-effectiveness analyses of ongoing flight training programs. The effectiveness of flight simulators for training, however, is not addressed in this paper; hence, the findings of this study alone do not provide the basis for judgements or decisions that require both cost and effectiveness data. The average variable operating costs of 39 simulators in use in the FY 1980-1981 time period fall within a narrow range ($116 to $170 per operating-hour), despite the diversity of simulator types and associated aircraft missions (e.g., bomber, fighter, cargo), and aircraft sizes or types (i.e., fixed-wing or rotary-wing). The simulator-to-aircraft operating cost ratios were about the same in the FY 1975-1976 and FY 1980-1981 time periods (27 and 39 combinations, respectively); the median value was 8 percent. No relationship was found between the type of simulators, as categorized by the Services (e.g., Part Task Trainer, Cockpit Procedures Trainer, Weapon Systems Trainer) and its operating costs. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N84-35133# Committee on Commerce, Science, and Transportation (U. S. Senate).

NASA AUTHORIZATION FOR FISCAL YEAR 1985
Washington GPO 1984 267 p Hearings before the Subcomm. on Sci., Technol., and Space of the Comm. on Com., Sci., and Transportation, 98th Congr., 2nd Sess., 28 Feb. and 1, 8, and 29 Mar. 1984
(GPO-32-363) Avail: Subcommittee on Science, Technology, and Space

Generally, NASA's budget for fiscal year 1985 is discussed. The President's proposal to build a manned orbiting space station is brought up, and the pros and cons are debated. With the perception that the Japanese and Europeans have moved ahead of the U.S. in the areas of telecommunications, the merits of the Advanced Communication Technology Satellite (ACTS) and it's impact on NASA's budget, are brought out. NASA has delayed ACTS by the decision to limit it to ground testing. The development of the space shuttle is brought out. The Spacelab flight is discussed, as are the issues concerning a fifth orbiter and an extended duration orbiter. Space science, space commercialization, theoretical astrophysics, and trade policies in space, are some of the issues. Artificial intelligence is given weight as an issue, with man-machine interaction also discussed. S.B.

N84-35134# Committee on Science and Technology (U. S. House).
REVIEW OF THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958, AS AMENDED
Washington GPO 1984 60 p refs Presented by the Subcomm. on Space Sci. and Appl. to the Comm. on Sci. and Technol., 98th Congr., 2d Sess., Sep. 1984
(GPO-38-705) Avail: Subcommittee on Space Science and Applications

A review of the National Aeronautics and Space Act of 1958 is provided based on hearings held by the Subcommittee on Space Science and Applications. The consensus view was that the National Aeronautics and Space Act is a sound piece of legislation that has reliably served the nation. Various speakers were in favor of increasing private sector involvement in future space activities. Others said that it was neither practical or desirable to turn the Space Transportation System over to a commercial venture. The issues discussed were: adequacy of the policy objectives of the National Aeronautics and Space Act of 1958; The need for long range planning; Adequacy of space policy advisory apparatus; management of shuttle operations; NASA's role in commercialization; NASA and national security; space science; international cooperation in space; the space station; program balance at NASA; need for a fifth orbiter; and potentials for a strong space applications program. S.B.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

No abstracts in this category.

88 SPACE SCIENCES (GENERAL)

N84-35135# European Space Agency, Paris (France).
FOURTH EUROPEAN IUE CONFERENCE
Erica Rolfe, comp. and Bruce Battrick, comp. Jul. 1984 538 p refs Proc. held in Rome, 15-18 May 1984; Sponsored by ESA and CNR
(ESA-SP-218; ISSN-0379-6566) Avail: NTIS HC A23/MF A01

The IUE observations of extragalactic objects, the interstellar medium, stellar spectra, and comets were discussed. For individual titles, see N84-35136 through N84-35233.

N84-35136# Royal Greenwich Observatory, Herstmonceux (England).
ULTRAVIOLET OBSERVATIONS OF NORMAL GALAXIES c89
M. A. J. Snijders *In* ESA Fourth European IUE Conf. Jul. 1984 p 3-9 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Ultraviolet observations of stellar populations of normal galaxies are reviewed. Satellite data show that elliptical galaxies and the bulges of spiral galaxies possess a hot star component of uncertain nature (the old versus young star dichotomy). The importance of a better understanding of the late stages of stellar evolution, from an observational and a theoretical viewpoint, is stressed. In spiral and elliptical galaxies undergoing a star-burst it is clear that young O and B type stars are responsible for the ultraviolet flux. Results for these objects are considered.
Author (ESA)

N84-35137*# Space Telescope Science Inst., Baltimore, Md.
ULTRAVIOLET STUDIES OF THE INTERSTELLAR MEDIUM c89
J. C. Blades *In* ESA Fourth European IUE Conf. Jul. 1984 p 11-20 refs Sponsored by NASA and ESA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Copernicus satellite and IUE investigations of the chemical composition and physical condition of interstellar gas and dust in our Galaxy, and in external systems are reviewed. The local interstellar environment, dust, and the distribution of gas away from the plane of our Galaxy are covered. Author (ESA)

N84-35138# Consiglio Nazionale delle Ricerche, Bologna (Italy). Ist. di Radioastronomia.
SUPERNOVAE c89
N. Panagia *In* ESA Fourth European IUE Conf. Jul. 1984 p 21-24 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE observations of Type 1 supernova SN 1983 n in NGC 5236 are discussed. The data suggest that spiral galaxies contain a sub-class of Type 1 SNe which does not exist in early type galaxies. Stellar progenitor of SN 1983 n was originally a rather massive star. Since in elliptical and SO galaxies massive stars are very rare while they are relatively numerous in spirals, low luminosity extension of the Type 1 SN distribution found in spiral galaxies is real and is accounted for by the end products of the evolution of relatively massive binary systems in which, however, neither of the components was massive enough to explode as a Type 2 SN. Author (ESA)

N84-35139*# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
CORONA MODELS TESTED WITH IUE AND EINSTEIN OBSERVATIONS c89
Reiner Hammer and Jeffrey L. Linsky (Joint Inst. for Lab. Astrophysics) *In* ESA Fourth European IUE Conf. Jul. 1984 p 25-32 refs (For primary document see N84-35135 24-88)
(Grants NGL-06-003-057; NAG5-82; DFG-SFB-132)
Avail: NTIS HC A23/MF A01

Compilations of IUE and Einstein observations which show that the emissions from the outer layers of cool stars are nonlinearly correlated are discussed. This result can be used to test theoretical corona models as well as hypotheses on the mechanism that determines the location of the transition region. In stars in which most of the X-ray emission originates in small coronal loops it may be necessary that part of the emitting plasma is hotter than 20 million K or that the transition region is not only heated by thermal conduction, but also by downflows. Observational evidence for both these effects, and methods for

analyzing the geometrical structure of outer stellar atmospheres are considered. Author (ESA)

N84-35140# Technische Univ., Munich (West Germany).
SPECTRAL ANALYSIS OF (VERY) HOT STARS: METHODS AND RESULTS **c89**
R. P. Kudritzki *In* ESA Fourth European IUE Conf. Aug. 1984 p 33-41 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Combined UV and visual quantitative spectral analysis of hot stars is summarized. The photospheres of very hot stars, the HR diagram of massive O stars, the atmospheres of subluminous OB stars, the atmospheres of the central stars of planetary nebulae, and the evolution of central stars of planetary nebulae and subluminous O and B stars were studied. Author (ESA)

N84-35141# Amsterdam Univ. (Netherlands). Institute of Astronomy.
THE STELLAR WIND ENIGMA IN EARLY TYPE STARS: THE HIGH-VELOCITY, NARROW ABSORPTION LINES IN THE UV **c90**
Huib Heinrichs *In* ESA Fourth European IUE Conf. Jul. 1984 p 43-54 refs Sponsored by Niels Stensen Foundation (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Narrow, high-velocity absorption components in UV spectra of early-type stars are discussed. The distribution of stars showing this phenomenon is presented in an HR diagram. More than 50% of luminous stars with Mbol < - 7.5 show narrow absorptions. Their occurrence in less luminous stars is found to be strongly connected with the Be phenomenon. The observed time variability of the narrow lines is reviewed, especially the memories found in stars. Models to explain the narrow absorptions are considered. Author (ESA)

N84-35142# Osservatorio Astronomico, Trieste (Italy).
IUE IMPACT ON THE STUDIES OF THE ZETA AUR, ALGOL AND W SER INTERACTING BINARY SYSTEMS **c90**
M. Hack *In* ESA Fourth European IUE Conf. Jul. 1984 p 55-61 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE results for the Zeta Aur systems (including Epsilon Aur), the Algol systems and the W Ser systems (including Beta Lyr) are reviewed. In spite of the different length of the periods, the interaction of the wind from the star that is losing mass with its companion or with its surroundings produces the same spectroscopically observable effects in all these systems: high temperature plasma (NV, C IV, Si IV lines are usually present) and a clumpy medium of relatively high density (forbidden and semiforbidden lines are only exceptionally present). Author (ESA)

N84-35143# Royal Observatory, Edinburgh (Scotland).
STUDY OF HOT SPOT GALAXIES **c89**
K. Nandy and G. I. Thompson *In* ESA Fourth European IUE Conf. Jul. 1984 p 65-68 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The UV flux distributions of several hot spot galaxies were obtained with the IUE in the low dispersion, large aperture mode. The UV spectra do not suggest the presence of O type stars in marked contrast to Markarian galaxies. The NIII lambda, 1750 and CIII lambda 1909 lines from high excitation HII regions or planetary nebulae are not present. The UV flux distributions were used to determine the population of early type stars. They show evidence of reddening but the lambda 2200 dust feature is clearly absent. Author (ESA)

N84-35144# Institut d'Astrophysique, Paris (France).
FAR UV EXCESS AND GAS CONTENT OF SO GALAXIES **c90**
B. Rocca-Volmerange and C. Balkowski (Observatoire de Paris-Meudon, France) *In* ESA Fourth European IUE Conf. Jul. 1984 p 69-72 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Far ultraviolet excess of the SO galaxies NGC 5102 (gas rich) and NGC 3115 was studied by IUE. Comparison with optical and UV stellar continua gives a uniform stellar population of A3 and G2 respectively. The UV excesses, normalized to the V band, represent a very low fraction (1% to 2%) of the total emitted energy. Author (ESA)

N84-35145# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain).
ULTRAVIOLET STUDY OF THE STELLAR POPULATION OF THE GIANT EXTRAGALACTIC HII REGION NGC 604 **c89**
Sanz Fernandez deCordoba and P. Benvenuti (Space Telescope-European Coordinating Facility Garching, West Germany) *In* ESA Fourth European IUE Conf. Jul. 1984 p 73-75 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The brightest part of the HII region NGC 604 was repeatedly observed in the ultraviolet range, in low resolution, with IUE. The ultraviolet spectra of NGC 604 are fitted with synthetic spectra, a mixture of O and B early type stars and WR stars. No constraints are imposed a priori and only corrections for reddening are taken into account. The observed spectra of NGC 604 can be satisfactorily fitted to the synthetic spectra in the continuum and in the stellar emission and absorption features. Author (ESA)

N84-35146# Science Research Council, Chilton (England). Astrophysics Group.
THE BROAD ABSORPTION LINE REGION IN NGC 4151 **c89**
G. E. Bromage, A. Boksenberg (Royal Greenwich Observatory), J. Clavel (Observatoire de Meudon, France), M. H. Demoulin-Ulrich (European Southern Observatory), A. Elvius (Stockholm Univ.), M. V. Penston (Royal Greenwich Observatory), G. C. Perola (Rome Univ.), M. Pettini (Royal Greenwich Observatory), and M. A. J. Snijders (Royal Greenwich Observatory) *In* ESA Fourth European IUE Conf. Jul. 1984 p 77-79 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Extensive monitoring of Seyfert galaxy NGC 4151 with IUE yielded information on the absorption line region in the active galactic nucleus. The absorption spectrum and variability data suggest a model with large numbers of absorbing clouds that are almost optically thin. Column denstiy of absorbers N(H), as derived from ultraviolet C and Si lines, is at least 10 to the 21st power/sqcm. Information on space densities (including metastable level populations), on the ranges of emission region velocities that are covered by absorbers, and the lack of observable time lags in absorbers' response to continuum flux changes, together indicate that most absorption occurs in a thin shell in the outermost parts of the Broad Line Region. Author (ESA)

N84-35147# Observatoire de Paris-Meudon (France). Lab. d'Astrophysique 173.
THE SEYFERT 1 GALAXY NGC 4593 (3). VERY RAPID VARIATIONS OF ITS FAR UV SPECTRUM AND THEIR IMPLICATIONS **c89**
J. Clavel *In* ESA Fourth European IUE Conf. Jul. 1984 p 83-89 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

New IUE observations of the Seyfert 1 galaxy NGC 4593 revealed variations by a factor 2.3 in 69.7 hr of the intensity of its nuclear continuum at 1450 A. This result sets an upper limit of 2.2 plus or minus 0.3 light days to the diameter of its far UV continuum emitting region, very close to that found for the X-ray source in other low-luminosity Seyfert 1's. In the same time interval, the intensities and the profiles of the main UV emission lines did not vary. These data, together with results obtained previously, are entirely consistent with the hypothesis that a 100 million M-black hole accretes at 4% of its Eddington limit in the nucleus of NGC 4593. Only 3% of the accretion flow is in the form of broad line emitting gas. Author (ESA)

N84-35148# Goettingen Univ. (West Germany).
IUE OBSERVATIONS OF MULTIPLE NUCLEUS GALAXIES

c89

W. Kollatschny and K. J. Fricke *In* ESA Fourth European IUE Conf. Jul. 1984 p 91-95 refs (For primary document see N84-35135 24-88)
(Grant DFG-Fr-325/21-1)
Avail: NTIS HC A23/MF A01

The UV spectra of the 4 double nucleus Markarian galaxies Mkn 266, 463, 673, and 1027 are described. The first three have nonthermal nuclei and Seyfert or Liner characteristics in the line spectra of the component nuclei; Mkn 1027 has an absorption line spectrum typical for extragalactic HII regions. Author (ESA)

N84-35149# European Space Agency, Madrid (Spain).
THE 1978 - 1984 FADING OF THE SEYFERT 1 GALAXY F-9 c89

W. Wamsteker, R. Gilmozzi, P. Benvenuti, A. Cassatella, B. J. M. Hassall, A. Talavera, A. W. Harris (Science and Engineering Research Council, Madrid), H. Netzer (Texas Univ., Austin), D. Wills (Texas Univ., Austin), and B. J. Wills (Texas Univ., Austin) *In its* Fourth European IUE Conf. Jul. 1984 p 97-99 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Results of simultaneous optical and UV spectra for the Seyfert 1 galaxy F-9 are presented. The UV variability is shown to be very large and to decrease with wavelength. It is shown that at one epoch a good fit to the continuum can be obtained with a single power law spectrum, Ba continuum and Fe II emission. Author (ESA)

N84-35150# Cambridge Univ. (England). Inst. of Astronomy.
MCG-2-58-22 = Mkn 926. A HIGH LUMINOSITY SEYFERT GALAXY WITH TWO DISTINCT BROAD LINE COMPONENTS c89

Michael Jones and Martin Ward *In* ESA Fourth European IUE Conf. Jul. 1984 p 101-105 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Single epoch, near simultaneous optical and ultraviolet spectra were used to derive a snapshot list of MCG-2-58-22 emission line fluxes. A composite spectrum containing many epochs of data is used to study the line profiles. Using data ranging from 21 cm radio continuum to 30 KeV X-ray, the vFv energy distribution is discussed. Variations in the Lyman alpha emission line are reported. Author (ESA)

N84-35151# Consiglio Nazionale delle Ricerche, Bologna (Italy).
MULTIFREQUENCY OBSERVATIONS OF THREE ACTIVE GALAXIES c89

L. Bassani, M. J. Coe (Southampton Univ., England), R. Clement (Southampton Univ., England), A. J. Dean (Southampton Univ., England), G. DiCocco, B. Elsmore (Cambridge Univ., England), M. Ferrari-Toniolo, F. Giovannelli, J. MacDougall (Science Research Council, Didcot, England), P. Persi et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 107-110 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Ultraviolet spectra were obtained for Mk 501, MGC 8-11-11 and NGC 1275 as part of a multiwaveband observational program of active galactic nuclei. The IUE data of the BL Lac object Mk 501 and the Seyfert galaxy MGC 8-11-11 are presented together with contemporaneous radio and near infrared observations. The broadband spectra do not show any unusual behavior compared with previous observations. For NGC 1275, a galaxy of uncertain classification, near infrared data were also obtained within 2 weeks of the IUE measurement. Compared with previous near infrared photometry, the observations indicate that the source is characterized by an unusual spectral profile. Author (ESA)

N84-35152# Consiglio Nazionale delle Ricerche, Milan (Italy). Inst. di Fisica Cosmica.
MULTIFREQUENCY OBSERVATIONS OF ACTIVE GALACTIC NUCLEI c89

E. G. Tanzi, L. Chiappetti, J. Danziger (European Southern Observatory, Garching, West Germany), R. Falomo (Osservatorio di Brea, Italy), D. Maccagni, L. Maraschi, A. Treves, and W. Wamsteker (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 111-117 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Active Galactic Nuclei were observed simultaneously with EXOSAT, IUE and ground based telescopes in order to determine the overall energy distribution over a wide frequency range. Repeated observations of highly variable objects were used to study correlated variability in different spectral domains. Analyses of repeated observations of the BL Lac object PKS 2155-304 and of the Seyfert Galaxies 3C 120 and MGC 8-11-11 are described. For PKS 2155-304 the soft X ray flux increases by a factor of 5 within a month while a corresponding brightening of 30% is observed in the UV. In 3C 120 a variation of a factor of 2 is observed in the UV on time scales of months, while no simultaneous variation in the X rays is apparent; MGC 8-11-11, steady in the UV, shows a substantial variation in soft X rays, possibly due to variation of the intrinsic absorption cut off. Author (ESA)

N84-35153# Milan Univ. (Italy). Dipt. di Fisica.
UV OBSERVATIONS ON THE VARIABLE QUASAR PG 1351+64 c89

A. Treves, J. E. Drew (Cambridge Univ., England), R. Falomo (Osservatorio di Brea, Italy), L. Maraschi, E. G. Tanzi (CNR, Milan), and R. Wilson (University Coll., London) *In* ESA Fourth European IUE Conf. Jul. 1984 p 119-124 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The bright low red shift quasi stellar object PG 1351+64 was repeatedly observed with IUE. The spectra exhibit strong emission lines superposed to a continuum with a spectral index of -0.3 for a single power low fit in the 1200 to 3000 A range. Variations of a factor 2 in line and continuum intensity are observed with a minimum time scale of a month. The nature of the continuum emission is discussed and an upper limit to the mass within the line emitting region is deduced from the observed line variability. Author (ESA)

N84-35154*# Kitt Peak National Observatory, Tucson, Ariz.
QUASARS AS PROBES OF THE INTERGALACTIC MEDIUM c89

Richard F. Green and Jill Bechtold (Arizona Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 125-128 refs (For primary document see N84-35135 24-88)
(Grant NAG5-38)
Avail: NTIS HC A23/MF A01 CSCL 03A

Spectral energy distributions for 10 high red shift quasars in the wavelength range 1250 to 10,000 A were obtained by IUE. A pronounced steepening is detected shortward of 1200 A, which correlates well with quasar red shift, but poorly with luminosity. The observed slope change is explained by Lyman continuum absorption from the strongest 5% of the Lyman alpha forest lines, identified with the low column density metal containing systems. Reddening may also contribute to the steepening, but a much lower neutral gas to dust ratio than that found in the Galaxy is required. Optically thick Lyman limit discontinuities are seen with zabs $<<$ zem. These systems are metal containing, constant in comoving density with epoch, and require in L* galaxy to have a cross section of 5 to 10 Holmberg radii. Author (ESA)

N84-35155# Observatoire de Strasbourg (France).
THE INTERSTELLAR ABSORPTION IN THE DIRECTION OF SOME NEARBY A STARS c90

R. Freire-Ferrero *In* ESA Fourth European IUE Conf. Jul. 1984 p 133-137 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The interstellar medium in the direction of four A-stars that are fast rotators, in the range 1250 to 1800 A, and 7 fast rotators and 2 low rotators in the range 2000 to 3000 A was studied by IUE. Interstellar Mg II absorption is observed, centered or not in the stellar line cores. Other interstellar lines probably present are

Fe II, A1 II, Si II, C II and S II. The A-type stars that rotate slowly may also be useful to determine Mg II interstellar contributions, when the theoretical stellar Mg II line profile is known. Preliminary widths of these interstellar lines are deduced from the observations. Author (ESA)

N84-35156# Osservatorio Astronomico, Trieste (Italy).
USE OF HIGH RESOLUTION IUE SPECTRA OF MG 2 IN COOL STARS TO PROBE THE LOCAL INTERSTELLAR MEDIUM c89
P. Molaro, J. E. Beckman (Queen Mary Coll.), L. Crivellari, M. L. Franco (Instituto de Astronomia y Fisica del Espacio), and G. Vladilo *In* ESA Fourth European IUE Conf. Jul. 1984 p 139-143 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

It is shown that, given suitable radial velocity values for the stars and the local interstellar medium (LISM) interstellar absorption can be distinguished from chromospheric self absorption within the MgII emissions from late type stars. Beta Hyi (G2IV) offers a clear example. Zeta Tuc (G2V) and delta Pav (G8V) which are very close to beta Hyi show similar narrow MgII absorption features, which are also interpretable as interstellar. Narrow MgII absorptions in the rapidly rotating F-type stars beta TrA and alpha Hyi are reported. The absence of IS Mg II in the stars tau Cet and 24UMa confirms the presence of a hole in the LISM near galactic longitude 150 deg. Author (ESA)

N84-35157# Queens Univ., Belfast (Northern Ireland). Dept. of Pure and Applied Physics.
FURTHER STUDIES OF NEARBY HIGH VELOCITY INTERSTELLAR GAS c90
B. Bates, W. Brown-Kerr, D. L. Giaretta (Science Research Council, Chilton, UK), and F. P. Keenan *In* ESA Fourth European IUE Conf. Jul. 1984 p 145-149 refs Sponsored by UK Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Red shifted high velocity gas components (HVC) were detected in spectra of nine out of a survey of 47 stars. The properties of gas density and thickness of the material responsible for the HVC appear quite similar to those derived from direct observations of supernova remnants (SNR). The majority of the survey stars whose spectra show HVC lie close to the Galactic plane near l = 88 to 110 deg. A distance estimate places the HVC material within 190 pc. The improved mapping of the sky and the distance estimate to the HVC material are discussed in terms of an association with nearby radio loops. The possibility that the material may be produced by two interacting SNR (Loops 2 and 3) is considered. Author (ESA)

N84-35158# Science Research Council, Chilton (England).
A GENERAL SURVEY OF THE CORRELATION OF INTERSTELLAR ELEMENT DEPLETION WITH LINE-OF-SIGHT DENSITY INDICATORS c90
Alan W. Harris, Gordon E. Bromage, and Cecile Gry (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 151-155 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The density dependence of depletion for 14 elements in the interstellar medium was studied using gas phase abundance data, the column density of hydrogen, N(H), and the mean space density of hydrogen, n(H). The depletion estimates of many elements correlate much better with n(H) than with N(H), while for Zn, O, N and D there is virtually no correlation with n(H). In the interstellar medium, it appears that depletion processes are not confined to dense clouds. Large variations in interstellar deuterium abundance are not correlated with either density parameter, casting doubt on suggestions that deuterium depletion may be substantial. Author (ESA)

N84-35159# Science Research Council, Chilton (England). Rutherford Appleton Lab.
INTERSTELLAR CHLORINE ABUNDANCE: RESULTS AND IMPLICATIONS OF A LARGE-SCALE SURVEY c90
Alan W. Harris and Gordon E. Bromage *In* ESA Fourth European IUE Conf. Jul. 1984 p 157-160 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Gas phase abundances of interstellar chlorine were estimated for over 40 Galactic sight lines using Copernicus data and equivalent widths from IUE spectra. The background stars have distances of up to 3 kpc and total hydrogen column densities from 6 times 10 to the 19th to 7 times 10 to the 21st power per sqcm. Results show Cl to be significantly depleted: the derived abundance values range over more than an order of magnitude and correlate very well with the mean space density of hydrogen. A mean gas phase abundance of 5.0 on the usual log scale, compared to the probable solar value of 5.5 is found, in spite of the supposed volatility of Cl. Author (ESA)

N84-35160# Observatoire de Paris (France).
INTERSTELLAR LINES IN HIGH RESOLUTION IUE SPECTRA OF RUN-AWAY B TYPE STARS c89
J. Berger, R. Freire-Ferrero, A. M. Fringant, M. Gerbaldi, and N. Morguleff *In* ESA Fourth European IUE Conf. Jul. 1984 p 161-166 refs Prepared in cooperation with Observatoire de Strasbourg, Paris-Sud Univ. and Institut d'Astrophysique (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

About 60 interstellar lines were detected in the spectra of three runaway stars situated at large distance above the galactic plane. The lines identified come from: lower ionized species like CI, NI, OI, MgI, SI, CII, SiII, SII, MgII, FeII; higher ionized species such as AlIII, SiIII, CIV, SiIV and probably NV. Very saturated ones like the MgII lines suggest the presence of MgII away from the galactic disk. Provisional equivalent widths are given. The possibility of a circumstellar origin for narrow absorption lines is discussed. It is concluded that velocity data provided by the position of the interstellar lines do not support the hypothesis of a physical association with the surroundings of the star. Author (ESA)

N84-35161# Kapteyn Astronomical Lab., Groningen (Netherlands).
THE INTERSTELLAR MEDIA IN THE SCORPIUS-OPHIUCHUS REGION c90
T. H. Pwa and S. R. Pottasch *In* ESA Fourth European IUE Conf. Jul. 1984 p 167-173 refs Sponsored by Netherlands Research Foundation (ZWO) (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Lines of sight from stars in the Sco-Oph complex are analyzed. Data are high resolution IUE spectra with visual and 21 cm radio observations. Abundances are compared to solar values. Zinc proves to be a good metallicity tracer since it is only depleted by a factor of <2; P and Cl are slightly depleted; Mg, Si and Fe are depleted by 0.04 to 0.08. The most severely depleted are Ni, Cr and Al, at 0.003. Carbon monoxide is well observed in one of the stars in isotopes C12O and C13O. Their respective column densities are 14.5 and 13.4 (logarithmically), giving a low isotope ratio of 11. Using ionization equilibria electron densities are computed. It is found that ne varies from 0.02 to 0.20. From excitation balance total particle density in the neutral cloud of 1.5 to 2.2 is derived. Author (ESA)

N84-35162# Kapteyn Astronomical Lab., Groningen (Netherlands).
INTERSTELLAR AND NEBULAR ABSORPTION LINES IN PLANETARY NEBULAE c89
T. H. Pwa, J. E. Mo, and S. R. Pottasch *In* ESA Fourth European IUE Conf. Jul. 1984 p 175-178 refs Sponsored by Netherlands Research Foundation (ZWO) (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

High resolution IUE spectra were used to separate the narrow absorption lines due to the interstellar material and the nebular matter in NGC 6543. Column densities of ions in both regions were determined and the ionic and elemental abundances were derived. Lines from the fine structure levels yield the electron density in the nebula: log n = 3, consistent with the current

value found for eNGC 6543. Using Lyman alpha absorption and interstellar absorption lines of S and Zn the foreground extinction was estimated: E(B-V) = 0.04. The hydrogen column density towards NGC 6543 is found to have log NH = 20.35.
Author (ESA)

N84-35163# Tuebingen Univ. (West Germany). Inst. of Astronomy.
THE DIFFUSE INTERSTELLAR MEDIUM IN THE MAGELLANIC CLOUDS (REVIEW) c90
Klaas S. deBoer *In* ESA Fourth European IUE Conf. Jul. 1984 p 179-182 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Research on the diffuse interstellar medium, in the Magellanic Clouds, particularly IUE observations, is reviewed. Emission nebulae, radio emission lines, dust, absorption lines, and the large scale nature of the medium are discussed. Author (ESA)

N84-35164# Tuebingen Univ. (West Germany). Inst. of Astronomy.
UV-BRIGHT STARS IN GALACTIC GLOBULAR CLUSTERS, THEIR FAR-UV SPECTRA AND THEIR CONTRIBUTION TO THE GLOBULAR CLUSTER LUMINOSITY c89
Klaas S. deBoer *In* ESA Fourth European IUE Conf. Jul. 1984 p 185-186 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Ultraviolet bright stars in 7 galactic globular clusters were observed with the IUE in the low dispersion mode between 1150 and 3000 A. The stars are: BS in 47 Tuc, vZ1128 in M3, UHB in M5, B29 and IV-52 in M13, I-33 im M10, ROB162 in NGC6397, and K559, K648 and K996 in M15. The spectral energy distributions are used to derive effective temperatures and stellar luminosities. Such stars produce slightly less than 1% of cluster luminosity. Their contribution to the cluster UV intensity varies from 3% at 3300A to >50% at 1200A. In one cluster 60% of the total 1550A intensity comes from the single sdO star.
Author (ESA)

N84-35165# Institut d'Astrophysique, Paris (France).
ULTRAVIOLET FLUXES OF BLUE STRAGGLER STARS c89
M. Gerbaldi and N. Morguleff *In* ESA Fourth European IUE Conf. Jul. 1984 p 187-190 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Low resolution IUE spectra of blue straggler stars are presented, and their appearance is compared with normal stars and stellar atmosphere models. Stars HD 73666, HD 6870, HD 170054 and Fagerholm 81 were observed. Compared to normal stars of the same spectral type, HD 73666 behaves in a similar manner, but the 3 others present differences which are noticeable and all different, so no general conclusion about the origin of blue stragglers is possible. Author (ESA)

N84-35166*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
ULTRAVIOLET AND OPTICAL OBSERVATIONS OF METAL DEFICIENT RED GIANTS AND CHROMOSPHERIC MODELS c89
A. K. Dupree, E. H. Avrett, L. Hartmann, and G. Smith *In* ESA Fourth European IUE Conf. Jul. 1984 p 191-195 refs (For primary document see N84-35135 24-88)
(Grants NAGW-511; NAG5-87)
Avail: NTIS HC A23/MF A01 CSCL 03A

Three metal deficient field stars were observed in the ultraviolet and optical spectral regions: HD 165195, HD 110281, and HD 232078. High dispersion spectra near H alpha, and low dispersion, long wavelength IUE spectra were obtained. The H alpha profiles have strong asymmetric emission with absorption cores that are frequently asymmetric. The surface flux of Mg II lines is similar to that of luminous Pop I stars in spite of the lower metal abundance. Semi-empirical atmospheric models suggest that the characteristic emission in the wings of the H alpha line can arise within static chromospheres. Radial expansion gives an asymmetric, blue-shifted H alpha core accompanied by greater emission in the red line wing than the blue wing. Wind models with extended atmospheres suggest mass loss rates < < - 2 billion M/yr. Thus H alpha provides no evidence that steady mass loss is substantial enough to significantly affect the evolution of stars on the red giant branch of globular clusters. Author (ESA)

N84-35167# Osservatorio Astronomico, Trieste (Italy).
AN UPPER LIMIT TO THE BERYLLIUM ABUNDANCE IN THE POPULATION 2 STAR HD 140283 FROM A HIGH RESOLUION IUE SPECTRUM c90
P. Molaro, J. E. Beckman, and F. Castelli (Queen Mary Coll.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 197-201 refs Sponsored by Royal Society/Academia dei Lincei (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

An IUE archive spectrum of HD 140283 was analyzed in the region of the 3131 A 9 BeII resonance doublet. Comparison of the observed and synthetic spectra yields no measurable Be, and a conservative upper limit of 3x10 to the minus 12th power for 9Be, which is one fourth solar, can be set. With this star, and with population II star HD 76932 significant 9Be depletion is ruled out. The [9Be] limits set upper limits to the fraction of nonprimordial 7Li which may contribute to the [7Li] values observed in the same stars. Results support the conclusion that most of the observed 7Li is primordial, and validate the utility of [7Li] numbers in deriving the universal baryon/photon ratio using the standard Big Bang model. Author (ESA)

N84-35168# Catania Univ. (Italy). Istituto di Astronomia.
EMISSION LINES IN THE UV SPECTRUM OF ALPHA TAU c89
S. Catalano, C. Blanco, L. Bruca (International School for Advanced Studies), and E. Marilli (Catania Astrophysical Observatory, Italy) *In* ESA Fourth European IUE Conf. Jul. 1984 p 203-206 refs Sponsored by CNR and Ministero Pubblica Istruzione (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Identifications of ultraviolet emission lines of alpha Tau (K5 III) based on high dispersion IUE spectra are presented. In the long wavelength range, Fe I and Fe II emission lines and a possible Al II one in addition to the strong chromospheric MgII h and k resonance lines are identified. In the short-wavelength range only the prominent lines of OI, Si II and SI and the Ly alpha are identified. The absence of high temperature emission lines confirms that this late type giant does not have outer atmospheres hotter than 30,000 K. Author (ESA)

N84-35169# Observatoire de Strasbourg (France).
SEARCH FOR CHROMOSPHERIC INDICATORS IN A DWARF STARS c89
R. Freire-Ferrero and A. Talavera (ESTEC, Madrid) *In* ESA Fourth European IUE Conf. Apr. 1984 p 207-210 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

An IUE high resolution observational program, to search for chromospheric indicators in A normal stars, was started. Analysis of 16 stars (from A 0 V to A 8 IV) does not show any line core reversal on the UV high resolution spectra. Results indicate that chromospheres are probably absent in A type IV to V stars.
Author (ESA)

N84-35170# Observatoire de Strasbourg (France).
THE Mg 2 LINES IN A DWARF STARS c89
R. Freire-Ferrero, A. Talavera (ESTEC, Madrid), and P. Gouttebroze (CNRS, Verrieres-le-Buisson, France) *In* ESA Fourth European IUE Conf. Jul. 1984 p 211-215 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

High resolution IUE spectra, in the spectral region of the Mg II resonance lines of 16 A stars were obtained. To interpret these observations, the formation of Mg II lines in an A type stellar atmosphere for different values of Mg abundance and microturbulence within the framework of the NLTE theory with complete and

partial redistribution of the Mg II line profiles were studied. Observed and computed line profiles are compared and abundance values are established. Theoretical stellar line profiles are used to determine the interstellar contribution to the observed stellar Mg II line profiles. Author (ESA)

N84-35171# Observatoire de Strasbourg (France).
THE SEARCH FOR SUPERIONIZATION LINES IN A DWARF STARS **c89**
R. Freire-Ferrero and A. Talavera (ESTEC, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 217-221 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Seven dwarf stars belonging to spectral subtypes A 0 to A 4 were observed by IUE at high resolution. The resonance lines of Si IV (1400 A) and C IV (1550 A) and the doublet of He II (1640 A) were investigated. Results show that even if these lines are present in an A type atmosphere as very weak lines, the major spectral features in the corresponding spectral regions are blends of metallic lines. This is evidence for the absence of transition regions in A type IV to V stars. Author (ESA)

N84-35172# Osservatorio Astronomico, Trieste (Italy).
IUE SPECTRA OF THREE A0 V STARS ROTATING CLOSE TO THEIR BREAK-UP VELOCITY: HD 119921, HD 129685, HD 181296 **c89**
P. Molaro, C. Morossi, M. Ramella, and M. Franco (Instituto de Astronomia y Fisica del Espacio) *In* ESA Fourth European IUE Conf. Jul. 1984 p 223-225 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE spectra of the three A0V stars with the highest reported rotational velocity are analyzed. Superionization lines are certainly present only in the spectrum of HD 119921 (Z Cen) and they are found to be variable. Using a visible spectrum a value of the rotational velocity of 220 km/sec is given for Z Cen, considerably far from its break-up velocity. No clear evidence of superionization is found in the other two stars. Author (ESA)

N84-35173# Observatoire de Paris-Meudon (France).
THE WIND AND CHROMOSPHERE OF THE HERBIG Ae STAR AB AUR AS SEEN BY IUE **c90**
C. Catala *In* ESA Fourth European IUE Conf. Jul. 1984 p 227-231 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The Herbig Ae variable AB Aur (spectral type A0) MgII resonance lines (2796,2802 A) and CIV resonance line at 1548 A were studied. Results show the presence of a deep and extended chromosphere in the wind of AB Aur, where the temperature reaches 18,000 K. Constraints on the structure of the wind are derived. The mass loss rate is found to lie between 4 times 10 to the minus 11 and minus 7 billion M/yr. A pure thermal Doppler broadening is not sufficient to explain the profile of the MgII and CIV lines. Author (ESA)

N84-35174# Royal Greenwich Observatory, Hailsham (England).
A UV GLIMPSE OF T TAURI STARS **c89**
M. T. V. T. Lago (Grupo de Matematica Aplicada), M. V. Penston, and R. Johnstone (Sussex University, UK) *In* ESA Fourth European IUE Conf. Jul. 1984 p 233-237 refs Sponsored by Fundacao Calouste Gulbenkian (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE observational results of T Tauri stars and related objects are discussed. The presence around T Tauri stars of high temperature emitting regions where mechanical rather than radiative heating dominates; high resolution line profiles and their indication of the presence of strong winds; the origin of the continuum and molecular emission; variability, the UV flux; and the early Solar System are considered. Author (ESA)

N84-35175# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
MAGNETIC ACTIVITY IN LOWER MAIN SEQUENCE STARS **c90**
O. Vilhu *In* ESA Fourth European IUE Conf. Jul. 1984 p 239-242 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE satellite studied transition region plasma in main sequence F-M stars. The fractional flux (fTR/fbol) is proportional to Ro to the power -2.5, where Ro is a parameter resembling the Rossby-number. Other chromospheric-coronal indicators (from CaK to X-rays) show similar correlations, but with different slopes. An interpretation is given where the transition region flux is proportional to the area coverage filling factor Ar, and the clear saturation observed (fTR/fbol constant when Ro $<$ 0.3) is due to the total filling of the surface with coronal loops (Ar = 1). A simple dynamo model gives the behavior observed quantitatively. Binary effects, as a cause for the saturation, are small. Evidence against any clear decrease in the dynamo ability as the star becomes fully convective is produced. The magnetic braking in cataclysmic variables is discussed. Author (ESA)

N84-35176# Armagh Observatory (Northern Ireland).
IUE OBSERVATIONS OF BY DRACONIS **c89**
C. J. Butler, J. G. Doyle, A. D. Andrews, P. B. Byrne, J. L. Linsky (Joint Inst. for Laboratory Astrophysics), T. Simon (Joint Inst. for Laboratory Astrophysics), N. C. Marstad (Joint Inst. for Laboratory Astrophysics), M. Rodono (Catania Univ.), V. Pazzani (Catania Univ.), and C. Cutispoto (Catania Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 243-246 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Phased IUE low resolution observations of BY Draconis are discussed. They show no significant modulation of the prominent SWP emission lines over one rotation period. However a marginally significant anticorrelation of the MgII flux, and the flux in the LWR continuum, with the V light curve is observed, and is interpreted as due to plage type areas over the photospheric spots. Two SWP spectra show sporadic enhancements of the emission lines, as seen in other IUE spectra of flares. Author (ESA)

N84-35177# Catania Univ. (Italy). Ist. di Astronomia.
COORDINATED IUE AND GROUND-BASED OBSERVATIONS OF ACTIVE STARS: FLARE EVENTS ON YZ CMI, V 1005 ORI, AD LEO AND AR LAC **c89**
M. Rodono, G. Cutispoto, S. Catalano, J. L. Linsky (Joint Inst. for Laboratory Astrophysics), D. M. Gibson (Joint Inst. for Laboratory Astrophysics), A. Brown (Joint Inst. for Laboratory Astrophysics), B. M. Haisch (Lockheed Aircraft Corp., Palo Alto, Calif.), C. J. Butler (Armagh Observatory), P. B. Byrne (Armagh Observatory), A. D. Andrews (Armagh Observatory) et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 247-252 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Observations of stellar flares were obtained with IUE and ground-based facilities simultaneously over a wide range of wavelengths in order to study the effect of the flare radiation at different atmospheric levels. Observations include time-resolved IUE and optical spectroscopy, narrow and wide-band optical photometry, IR photometry, and microwave observations. Results include detection of IR flux decrease, or negative flare, in coincidence with flux increase at all other wavelengths. Author (ESA)

N84-35178# Observatoire de Strasbourg (France).
STATISTICAL CLASSIFICATION OF IUE STELLAR SPECTRA BY THE VARIABLE PROCRUSTEAN BED (VPB) APPROACH **c89**
A. Heck, D. Egret, Ph. Nobelis (Strasbourg Univ.), and J. C. Turlot (Strasbourg Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 257-261 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Statistical algorithms were applied to a set of stellar low-dispersion IUE spectra in order to derive objective spectral-classification schemes in the UV. In the variable procurstean bed (VPB) approach, the shape of the continuum together with the

most important emission and absorption features are taken into account to define distances in an adequate multivariate space. Principal-component and cluster analysis algorithms are applied to construct groups of stars which, together with the statistically most significant spectral features, are compared respectively with the existing classification frames and rules. The agreement is satisfactory. Author (ESA)

N84-35179# European Space Agency, Madrid (Spain). IUE Observatory.
IUE LOW DISPERSION SPECTRA REFERENCE ATLAS c89
B. J. M. Hassall, A. Heck, A. Talavera, D. Egret (Observatoire de Strasbourg), C. Jaschek (Observatoire de Strasbourg), and M. Jaschek (Observatoire de Strasbourg) *In its* Fourth European IUE Conf. Jul. 1984 p 263-266 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

An atlas containing 229 graphic spectra together with the corresponding fluxes and an ultraviolet spectral classification of normal stars is described. The preparation of this publication confirmed that MK classifications cannot simply be transferred to the ultraviolet range. A set of transparencies illustrates the reference sequences constructed from the ultraviolet data. A magnetic tape copy of all the spectra pertaining to this volume is available from the Strasbourg Stellar Data Center. Author (ESA)

N84-35180# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
IUE-HIGH RESOLUTION OF ONV-STARS c89
D. Schoenberner, K. P. Simon (Technische Univ., Munich), and R. P. Kudritzki (Technische Univ., Munich) *In* ESA Fourth European IUE Conf. Jul. 1984 p 267-271 refs Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

High resolution IUE spectrograms of six peculiar, early type main sequence stars classified as ON (or BN) are compared with those of normal stars covering the same spectral class range. A differential curve-of-growth analysis using the N III-lines 1748, 1752 A, and the C III-line 1247 A reveals nitrogen enrichments for the peculiar stars of a factor of 5 and carbon depletions of about a factor of 10 compared with the normal stars. Author (ESA)

N84-35181# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
SPECTRAL ANALYSIS OF HELIUM POOR HOT SUBDWARFS c89
U. Heber and K. Hunger *In* ESA Fourth European IUE Conf. Jul. 1984 p 273-277 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Ultraviolet and visual spectra of 19 helium poor hot subdwarfs (sdB's and sdOB's) are analyzed for effective temperature, gravity and helium abundance using model atmospheres. The effective temperatures range from 25,000 to 75,000K. Helium is strongly depleted in the sdB's and sdOB's: helium number fraction varies from < 0.07% to 6%. From the (log g, T sub eff)-diagram it is concluded that the subluminous B-stars and most of the sdOB stars are (generalized) helium main sequence stars with a mass = 0.5 M. The helium deficiency of the atmosphere is brought about by diffusion. Three helium poor subdwarfs are discovered to be binaries. Author (ESA)

N84-35182# Queen Mary Coll., London (England). Dept. of Physics.
AN ANALYSIS OF THE HELIUM-WEAK STARS HD 144334 c89
H. J. Walker and A. E. Lynas-Gray (University Coll., London) *In* ESA Fourth European IUE Conf. Jul. 1984 p 279-283 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Low resolution IUE spectra of the helium-weak star HD 144334 are combined with S2/68 fluxes, and optical and infrared photometry. These data, using the infrared and total flux method, give T sub eff = 16,000K + or - 100K. From published Balmer line profiles the surface gravity is redetermined as log g = 4.10 + or - 0.05. Metallic ions in the high resolution IUE SWP spectra are identified, and the abundance determined for silicon, using Si III and Si IV lines, is found to be lower than the solar value. Author (ESA)

N84-35183# University Coll., London (England).
LIMB-DARKENING AND METAL ABUNDANCES IN THE SDOB PRIMARY OF THE ECLIPSING BINARY LB 3459 (AA DOR) c90
A. E. Lynas-Gray, U. Heber (Kiel Univ.), R. P. Kudritzki (Universitaets Sternwarte, Munich), and K. P. Simon (Universitaets Sternwarte, Munich) *In* ESA Fourth European IUE Conf. Jul. 1984 p 285-189 refs Sponsored by UK Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The LB 3459 is an eclipsing binary, consisting of a near degenerate secondary (of solar composition) and a subdwarf OB primary. Low resolution IUE spectra were obtained before and during primary eclipse. Secondary radius = (0.53 + or - 0.03) primary radius; primary limb darkening is predicted by the non-LTE model atmosphere. Metal abundances derived from high resolution SWP spectra might be explained by diffusion, which is also proposed as an explanation for helium depletion. Author (ESA)

N84-35184# European Space Agency, Madrid (Spain). Villafranca Satellite Tracking Station.
FLUX VARIATIONS OF 88 Her THROUGH PHASE TRANSITION FROM FAR UV TO VISUAL c90
M. Barylak and V. Doazan (Observatoire de Paris) *In its* Fourth European IUE Conf. Jul. 1984 p 291-295 refs Sponsored by ESOC (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The energy distribution and light variations of 88 Her at different phases (quasi normal B and Be-shell) from far UV to visual are analyzed. It is shown that the large decrease in luminosity observed in the visual at the beginning of a new Be-shell (H + metals) phase is even more pronounced in the far UV. On the contrary, when the Be-shell spectrum strengthens, the luminosity increases in all wavelengths, from far UV to visual. It is shown that 88 Her mimics reasonably well (at different phases and according to the magnitude, B or V, at which the fluxes were normalized) the energy distribution of standard models with Teff values ranging from 19,000 to 13,000K and log g = 4, i.e., the energy distribution of normal stars of spectral types B3V to B7V. The agreement between standard models and observations is satisfactory if only one magitude is taken into account. Author (ESA)

N84-35185# Observatoire de Paris (France).
POSSIBLE IDENTIFYING CHARACTERISTICS OF Be STARS c89
V. Doazan and R. N. Thomas (Institut d'Astrophysique) *In* ESA Fourth European IUE Conf. Jul. 1984 p 297-300 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Physical parameters whose size and behavior may identify a Be star independently of the presence (or non-presence) of H alpha emission are discussed. A decelerated model for Be and similar stars and an assertion that mass outflow variability is a sufficiant condition to produce the necessary deceleration are discussed. The far UV spectral changes in the CIV and A1III resonance lines of the Be star, theta CrB, during its normal B phase, 1980 to 1984 are summarized It is suggested that the observed changes in ionization reflect changes in the nonradiative heating of the chromosphere-corona, and that such variable heating, together with variable mass-loss, are Be-star characteristics. Author (ESA)

N84-35186# Osservatorio Astronomico, Trieste (Italy).
AN IUE STUDY OF Be STARS WITH Fe 2 EMISSIONS IN THE VISIBLE c89

P. L. Selvelli (Observatorio Nacional, Rio de Janeiro) and F. X. DeAraujo *In* ESA Fourth European IUE Conf. Jul. 1984 p 301-305 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE spectra of 24 Be stars showing Fe II emission lines in the optical range were studied. In this subclass of Be stars, represented by earlier objects, the outflow phenomenon seems to be enhanced with respect to the Be main class. The outflow velocities are not related to the spectral type or to the luminosity class. There seems to be a definite trend associating small outflow velocities with low v sin i values and vice versa. No Fe II emissions are detected in any of the objects; Mg II (in 4 objects) and C IV (P Cyg in HD 10516) are the sole emissions in the sample.
Author (ESA)

N84-35187# Lund Univ. (Sweden). Dept. of Physics.
NEW Fe 2 LINES IN IUE SPECTRA OF STARS c89
S. Johansson *In* ESA Fourth European IUE Conf. Jul. 1984 p 307-308 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The need for more atomic data for Fe II for astrophysical purposes is discussed in terms of present state and future work on the analysis of this spectrum. Special excitation conditions in stars allow highly excited states to be populated, for which data is needed. Interstellar lines are reported. Author (ESA)

N84-35188# Observatoire de Marseille (France).
THE ULTRAVIOLET SPECTRUM OF STARS HAVING OPTICAL Fe 2 EMISSION LINES c89
G. Muratorio, M. Friedjung (Institut d'Astrophysique), and R. Viotti (CNR, Frascati, Italy) *In* ESA Fourth European IUE Conf. Jul. 1984 p 309-313 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Analysis of data concerning the fluxes of FeII lines in the optical and the UV for luminous P Cyg stars, symbiotic objects, and Seyfert galaxies is discussed. When fluxes of individual lines are available, semi-empirical methods of deriving information, taking account of self absorption, are most appropriate, and can be interpreted if, for instance, the lines are thought to be formed in a stellar wind. When low resolution data only are available in the UV, methods of spectral synthesis are necessary. Work taking account of emission and absorption lines is described.
Author (ESA)

N84-35189# Astronomical Inst., Utrecht (Netherlands). Space Research Lab.
SHELL EJECTION PHENOMENA IN THE HYPERGIANT STAR P CYGNI c90
H. J. G. L. M. Lamers, P. Korevaar, and A. Cassatella (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 315-317 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The time evolution (1978 to 1983) of the shell lines in the hypergiant star P Cygni (BIIa+) is analyzed. The wind of P Cygni is characterized by a stable shell formed at large distance from the star, only seen in low excitation lines (Fe II) at 206 + or - 1.5 km/sec, and by a variable shell at lower velocities, seen also in FeIII in addition to Fe II. The variable shell is formed closer to the star and accelerates outwards as time increases. Analysis shows that a new variable shell is formed every 1 to 2 yr, indicating that shell ejection in P Cygni is a recurrent phenomenon.
Author (ESA)

N84-35190# University Coll., London (England). Dept. of Physics and Astronomy.
OBSERVATIONS OF EXTENSIVE VARIABILITY IN THE ULTRAVIOLET SPECTRUM OF xi PER c89
R. K. Prinja, H. F. Henrichs (Amsterdam Univ.), I. D. Howarth, and M. vanderKlis (Amsterdam Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 319-322 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

High resolution IUE observations of the 07.5 III star xi Per, taken between 1978 and 1984 are presented. The spectra reveal extensive variability in the Si IV resonance line doublet, characterized by shortward displaced narrow absorption components and much broader lower velocity features. Profile fitting is used to estimate central velocities and column densities of these varying features, and the plausibility of the shell ejection model is discussed. The continual presence of narrow absorption implies fairly frequent shell ejection, with subsequent episodes revealing a broad feature eventually narrowing and merging into the high velocity narrow absorption component. Author (ESA)

N84-35191# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica Spaziale.
ULTRAVIOLET AND OPTICAL OBSERVATIONS OF THE CYGNUS OB2 ASSOCIATION: The STAR 8A
F. Giovannelli, C. Bartolini (Bologna Univ.), C. Cacciari (Bologna Univ.), A. Guarnieri (Bologna Univ.), and A. Piccioni *In* ESA Fourth European IUE Conf. Jul. 1984 p 323-324 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Low resolution IUE spectra of 8A star were taken. The correction for the reddening, using Seaton's extinction law, gives E(B-V)=1.6 in agreement with the value derived from optical data. A notable feature of the UV spectra is the very strong C IV resonance line, which shows a clear P Cygni profile. A terminal velocity of the order of 5000 km/sec is estimated. From optical spectra a central depth Ac = 12.9% of the interstellar 4430 A feature is derived. Author (ESA)

N84-35192# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Astronomy.
THE NITROGEN ABUNDANCE IN WC STARS c90
W. Schmutz, C. Morossi (Osservatorio Astronomico, Trieste), and M. Ramella (Osservatorio Astronomico, Trieste) *In* ESA Fourth European IUE Conf. Jul. 1984 p 325-327 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Absorption at 1235 A in the IUE spectrum of the WC star HD 192103, identified as blue shifted P-Cygni absorption of N V 1240 was reanalyzed. The processed spectrum and comparisons with the same wavelength region in other Wolf-Rayet spectra, indicate that most probably nitrogen is not observed in HD 192103.
Author (ESA)

N84-35193# Kapteyn Astronomical Lab., Groningen (Netherlands).
HOT CENTRAL STARS IN PLANETARY NEBULAE c89
J. Mo, T. H. Pwa, and S. R. Pottasch *In* ESA Fourth European IUE Conf. Jul. 1984 p 329-331 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The Zanstra temperature for five hot stars is determined using IUE spectra. The ultraviolet part of the spectrum is much more favorable than the visual region for such a determination because the stellar continuum flux density is much stronger relative to the nebular continuum in the ultraviolet. Author (ESA)

N84-35194# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
MASS LOSS FROM THE CENTRAL STAR OF NCG 3242 c90
W.-R. Hamann, R.-P. Kudritzki (Universitaets Sternwarte, Munich), R. H. Mendez (Instituto de Astronomia y Fisica del Espacio), and S. R. Pottasch (Kapteyn Astronomical Inst.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 333-336 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The central star of NGC 3242 was observed with IUE in high resolution. The N V resonance doublet exhibits a weak P Cygni profile with photospheric components. Theoretical profiles are obtained from comoving-frame calculations, and the nitrogen ionization balance is computed. A mass loss rate of -10.1 to -8.1 is derived, while the final velocity is 2200 km/sec. Wind parameters compared with the parameters of the central star show that the

usual relations established for winds from early-type stars are fulfilled. Author (ESA)

N84-35195# University Coll., London (England).
A MODEL OF THE PLANETARY NEBULA NGC 3918 BASED ON IUE OBSERVATIONS **c90**
R. E. S. Clegg, J. P. Harrington (Maryland Univ.), and M. J. Barlow *In* ESA Fourth European IUE Conf. Jul. 1984 p 337-340 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

A photoionization model of NGC 3918 was constructed using high and low resolution IUE spectra, images of the nebula in H and OIII lines, together with optical, infrared and radio fluxes. The model has a nucleus with Teff = 117,000 K (the He II Zanstra temperature) and log g = 5.9. Nebular electron density diagnostics include SII, OII, CIII, SiIII, NeIV, and IOV line ratios, and yield projected densities in the range 3000 to 10,000 per cucm. Initial, homogeneous models give low-excitation line fluxes much weaker than observed; either a cylindrical or patchy geometry may explain this discrepancy. The nebula is carbonrich with C/O = 1.6, and IRAS fluxes can be matched with graphite grains of sizes 0.015 to 0.35 microns located inside the ionized region. The gas-to-dust ratio is 440 by mass. The expansion velocity of the nebula for 0+ ions is 25 km/sec. Author (ESA)

N84-35196# Armagh Observatory (Northern Ireland).
ROTATIONAL MODULATION OF SPOTS AND PLAGES ON RSCVn STARS **c90**
P. B. Bryne, J. G. Doyle, A. D. Andrews, C. J. Butler, N. C. Marstad (Joint Inst. for Laboratory Astrophysics), J. L. Linsky (Joint Inst. for Laboratory Astrophysics), T. Simon (Joint Inst. for Laboratory Astrophysics), M. Rodono (Catania Univ.), S. Catalano (Catania Univ.), C. Blanco (Catania Univ.) et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 343-349 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Observations of three RSCVn stars made with IUE are presented. Emission line fluxes are found to vary in antiphase with the stars' optical variations. These correlations are interpreted in terms of large-scale spots in the stellar photospheres with overlying magnetic loops, giving rise to nonthermal heating of the layers above the spots. Evidence of nonthermal gas motions which appear to be associated with the most active regions of the stars is also presented. Author (ESA)

N84-35197*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
MODELS FOR THE ACTIVE AND QUIESCENT REGIONS ON THE RS CVN-TYPE SYSTEM 2 PEGASI (HD 224085) **c90**
J. L. Linsky, A. Brown, N. C. Marstad, M. Rodono (Catania Univ.), A. D. Andrews (Armagh Observatory), C. J. Butler (Armagh Observatory), and P. B. Byrne (Armagh Observatory) *In* ESA Fourth European IUE Conf. Jul. 1984 p 351-354 refs (For primary document see N84-35135 24-88)
(Grant NAG5-82)
Avail: NTIS HC A23/MF A01 CSCL 03B

The IUE observations of the RS CVn binary system II Pegasi obtained during the period 1981 October 1-7 were used to derive the emission measure distributions and to calculate transmission region models of the quiescent and plage (active) regions of II Peg. Active region models were calculated assuming area coverages of 10%, 6%, 3% and 1% of the visible hemisphere. These models are used to provide lower limits to the electron pressure in the quiescent and plage regions, which are compared with the available density diagnostics. The amount of mechanical energy deposition required to account for the observed radiative losses is very large. Author (ESA)

N84-35198# Tuebingen Univ. (West Germany). Inst. fuer Astronomische.
OPTICAL AND ULTRAVIOLET OBSERVATIONS OF FK COMAE STARS **c89**
L. Bianchi (Osservatori Astronomico, Turin), M. Grewing, N. Appelmann, and A. Cassatella (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 355-358 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE observed the FK Comae and HD32918, a suggested member of the FK Comae class in the southern sky, around one minimum and one maximum of the light curve, to study chromospheric and transition zone lines dependence on the (orbital) phase. As the amplitude of the optical light curve is variable, and the stars frequently undergo flaring, ground based photometric coverage was secured around the time of the IUE observations, to know the state of activity of the stars. The IUE spectra reveal strong phase-dependent variations of the higher temperature lines, while the MgII lines do not vary. However, the strength of the MgII emission in FK Comae compared with that found in previous observations taken from the IUE archive, show that the intensity changed by a factor of 2. Author (ESA)

N84-35199# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
COORDINATED X-RAY AND ULTRAVIOLET OBSERVATIONS OF RU LUPI **c89**
F. Giovannelli (CNR, Frascati, Italy), G. S. Bisnovatyi-Kogan, I. M. Golynskaya, V. G. Kurt, S. A. Lanzin (Lenin State Pedagogical Inst.), T. A. Mizyakina, E. Yu. Shafer, V. M. Shamolin, E. K. Sheffer, A. S. Smirnoff et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 359-361 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The ASTRON satellite performed X-ray observations of RU Lupi in the range 2 to 25 KeV. A flux of 3 times 10 to the minus 11th power erg/sec is detected in the range 2 to 6 KeV. Nothing is detected at higher energies. The IUE observed RU Lupi in low resolution mode in SW and LW regions. The UV spectrum of RU Lupi shows strong similarities with those of other T Tauri-type stars, with the exception of the presence of He II (1640 A) emission line at a level of 6 times 10 to the minus 14th power erg/sqcm sec. Author (ESA)

N84-35200# Royal Observatory, Edinburgh (Scotland).
THE HYDROGEN-DEFICIENT IRREGULAR VARIABLE STAR V348 SGR **c89**
N. Kameswararao and K. Nandy (Indian Inst. of Astrophysics, Bangalore) *In* ESA Fourth European IUE Conf. Jul. 1984 p 363-366 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The distribution of the reddening material around V 348 Sgr was studied using the IUE low resolution spectra. The nebula surrounding the star has a reddening of E(B-V) = 0.3 caused mainly by the foreground interstellar medium. The reddening in the chromosphere (CII emission line region) is E(B-V)=0.9. The star shows variable circumstellar reddening and extinction. The nebula appears to be carbon poor and nitrogen rich whereas earlier optical studies show that in the chromosphere the abundance of carbon, helium, and neon are enhanced and hydrogen is very deficient. Thus there seems to be chemical separation between the nebula and the star. Author (ESA)

N84-35201# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
AN ESTIMATE OF V348 Sgr EFFECTIVE TEMPERATURE **c90**
U. Heber, A. Heck (Observatoire de Strasbourg), L. Houziaux (Institut d'Astrophysique, Liege), J. Manfroid (Institut d'Astrophysique, Liege), and D. Schoenberner *In* ESA Fourth European IUE Conf. Jul. 1984 p 367-370 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE low dispersion spectra of the irregular variable V348 Sgr taken close to maximum light were compared with those of the B-type stars HD 53138 and HD 58350 and with those of the extreme helium stars HD 12448 and LS II + 33 deg 005. Energy distribution of V348 Sgr was compared with a theoretical continuous distribution based on UBVRI and uvby photometric measurements close to maximum brightness. Results show that V348 Sgr has a

carbon-rich atmosphere and a spectral type between s+B3 and s+B5 in the UV (corresponding to between B3 Ia and B5 Ia in the visible). The object probably belongs to the group of extreme helium stars with an effective temperature of 15,000 to 16,000 K.
Author (ESA)

N84-35202# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
UV AND OPTICAL SPECTROSCOPY OF CLASSICAL NOVAE DURING OUTBURST c89
H. Drechsel and J. Rahe *In* ESA Fourth European IUE Conf. Jul. 1984 p 371-375 refs (For primary document see N84-35135 24-88)
(Grants DFG-Dr-131/4-1; DFG-131/5-1)
Avail: NTIS HC A23/MF A01

High and low dispersion UV spectra (1200 to 3200 A) of recent classical novae N Sgr 1982, N Mus 1983, and N Ser 1983 were obtained during early stages of decline. High dispersion IUE spectra of N Mus 1983 were obtained a few weeks and more than a year after the outburst in the nebular phase. Simultaneous optical spectroscopy was carried out for N Sgr 1982 and for N Mus 1983. The line spectra and continua are discussed. The electron density and temperature of the dilute envelope of N Sgr 1982 were derived. Conclusions about CNO overabundances, shell geometry, and speed classes of the different objects are drawn.
Author (ESA)

N84-35203# Cambridge Univ. (England). Inst. of Astronomy.
DWARF NOVAE THROUGH THE OUTBURST CYCLE c90
J. E. Pringle and F. Verbunt *In* ESA Fourth European IUE Conf. Jul. 1984 p 377-383 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Spectroscopic and photometric observations at optical and ultraviolet wavelengths of dwarf novae through their outburst cycles were obtained. The observations indicate that: different dwarf novae have different outburst patterns, but different outbursts of the same dwarf nova are very similar; at the start of the outburst the optical flux rises before the ultraviolet flux; during the decline ultraviolet and optical fluxes drop simultaneously; the spectral flux distribution of Z Cam systems is the same during standstill as during the decline from an outburst at the same mv; an appreciable ultraviolet flux is present at quiescence. Implications of these results for models of accretion disks and of dwarf nova outbursts are discussed.
Author (ESA)

N84-35204# European Space Agency, Madrid (Spain). IUE Satellite Tracking Station.
THE OUTBURSTS OF DWARF NOVAE c90
B. J. M. Hassall *In its* 4th European IUE Conf. Jul. 1984 p 385-386 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The dwarf nova VW Hydri was observed simultaneously in the UV and optical at several stages of outburst. The spectrum is modeled using a steady state model disk that radiates locally as a Kurucz atmosphere, together with an optically thin component. The spectrum on the rise is inconsistent with a steady disk, and may be used to discriminate between possible outburst mechanisms.
Author (ESA) activity

N84-35205# Cambridge Univ. (England). Inst. of Astronomy.
CONSTRAINTS ON STELLAR WINDS OF CATACLYSMIC VARIABLES DERIVED FROM ULTRAVIOLET RESONANCE LINES c90
J. E. Drew and F. Verbunt *In* ESA 4th European IUE Conf. Jul. 1984 p 378-389 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

To investigate the structure of winds in cataclysmic variables the ultraviolet spectra of two such systems during eclipse were studied. The relative and absolute strengths of the ultraviolet resonance lines, N V 1240, C IV 1549 and Si IV 1397, as well as their lack of eclipsing behavior may indicate that these lines are extremely optically thick to resonance scattering. This demands both high mass loss rates and the coexistence of quite large fractions of N4+, C3+ and Si3+. The theoretically predicted ionization structure of a spherical wind originating from the white dwarf region is compared with the structure suggested by the observations. The wind of the secondary may be important.
Author (ESA)

N84-35206# Consiglio Nazionale delle Ricerche, Frascati (Italy). Inst. di Astrofis.
SS CYGNI: ACCRETION DISK MORPHOLOGY c90
F. Giovannelli, C. Bartolini (Bologna Univ., Italy), P. Candy (Bologna Univ., Italy), S. Guadenzi (Rome Univ., Italy), A. Guarnieri (Bologna Univ., Italy), R. Lombardi (Rome Univ., Italy), and A. Piccioni *In* ESA 4th European IUE Conf. Jul. 1984 p 391-393 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE spectra of SS Cygni in quiescence together with optical medium dispersion spectra were studied. The ultraviolet spectrum shows a power law distribution F lambda alpha Lambda sup alpha. The values of alpha best-fitting the spectra are -4 and -1 shortward and longward of 1450 A, respectively. The optical spectra show double peaked Balmer lines occasionally masked by a low velocity emission.
Author (ESA)

N84-35207# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
UV AND OPTICAL OBSERVATIONS OF THE NOVALIKE OBJECT V3885 SGR c89
K. Haug, H. Drechsel, and J. Rahe *In* ESA 4th European IUE Conf. Jul. 1984 p 395-397 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

High and low dispersion UV (1200 to 3200 A) and optical (4100 to 7800 A) spectra of the novalike object V3885 Sgr were obtained. The UV spectra exhibit highly ionized resonance features, in part (e.g., C IV 1550) with P Cygni profile. The optical region is characterized by broad and shallow Balmer absorption lines with superimposed complex emission components. The absorption and emission features show pronounced phase dependent velocity and intensity variations. The continuum intensity distribution in the optical and UV range is compared with a steady-state accretion disk model. Physical conditions in the disk and the structure of the system are discussed.
Author (ESA)

N84-35208# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Astronomy.
TWO DENSITY COMPONENTS IN SYMBIOTIC STARS c90
W. Deuel and H. Nussbaumer *In* ESA 4th European IUE Conf. Jul. 1984 p 399-402 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Evidence that the nebular emission of V 1016 Cyg originates from at least two emission regions of widely different particle densities is derived from IUE spectra. It is suggested that a hot (200,000K) stellar source provides the ionizing radiation for a low density, Ne = 1 million/cucm, nebula. This nebula has a radius of 7 times 10 to the 15th power cm and electron temperature between 10,000 and 20,000K, containing 0.01M. The collisionally ionized high density cloud may contain a mass as low as 10 to the minus 9 M, located in the outer part of the Mira wind, at the point of collision of two stellar winds, a Mira wind and a wind from a hot star.
Author (ESA)

N84-35209# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. Astrofisica.
A NEW OUTBURST OF Z ANDROMEDAE c90
R. Viotti, A. Cassatella (ESA, Madrid), and A. Altamore (Rome University, Italy) *In* ESA 4th European IUE Conf. Jul. 1984 p 403-406 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE observed the symbiotic star Z And, which after a long period of quiescence underwent a luminosity brightening which

could be the beginning of a new active phase. Analysis of the IUE observations reveals a large decrease of the continuum temperature. The high ionization lines of HeII, CIV and OIII appear stronger, while NV remains nearly constant and, contrary to expectation, OI weakens. This behavior during outburst appears different from the UV variability observed during the preoutburst quiescent phase. Author (ESA)

N84-35210# Osservatorio Astronomico, Trieste (Italy).
THE SPECTRUM OF THE SYMBIOTIC STAR CH CYGNI IN JANUARY 1984 c89
C. Boehm, M. Hack, and M. Persic (International School for Advanced Studies, Trieste, Italy) *In* ESA 4th European IUE Conf. Jul. 1984 p 407-408 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Several UV spectra of CH Cygni were obtained by IUE since April 1978, while behavior in the photographic and visual range was followed continuously from immediately after the onset of the active phase. The continuum energy distribution and the emission spectrum indicate that the activity phase started in 1977 is still in progress. Significant variations in the appearance of the emission spectrum with respect to the previous spectra are found, while the continuum remains nearly unchanged. Author (ESA)

N84-35211*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for Astronomy and Solar Physics.
OPTICALLY-THICK, HIGHLY-VARIABLE PLASMA IN INTERACTING BINARIES c75
Yoji Kondo, George E. McCluskey (Lehigh University), and Sidney B. Parsons (Space Telescope Science Institute) *In* ESA 4th European IUE Conf. Jul. 1984 p 409-410 refs (For primary document see N84-35135 24-88)
(Grant NSG-5386)
Avail: NTIS HC A23/MF A01 CSCL 20I

The interacting binaries HD 207739 and R Arae were observed by IUE. The ultraviolet spectrum of HD 207739 undergoes complex variations in both the lines and the continuum. Considerable circumstellar matter is present; R Arae (B9p + ?) exhibits SiIV, CIV and even NV absorption features. Both the lines and continuum are variable. An unusual secondary eclipse which is deeper in the ultraviolet than in the visible is present near phase 0.6. The CII line has a P cygni profile with emission present at all observed phases. These systems are probably in a relatively short-lived phase of evolution which is not often observed. Author (ESA)

N84-35212# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
UV AND OPTICAL SPECTROSCOPY OF W SERPENTIS OBJECTS c89
W. Strupat, H. Drechsel, and J. Rahe *In* ESA 4th European IUE Conf. Jul. 1984 p 411-413 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Ultraviolet (IUE) and optical spectroscopic observations of W Serpentis objects (W Ser, W Cru, AR Pav, RX Cas, SX Cas) were analyzed. Results indicate the presence of circumstellar plasma with high degree of ionization. These objects are believed to be near contact or even contact systems, presently in an evolutionary stage, where a common envelope is formed. Author (ESA)

N84-35213# Osservatorio Astronomico, Trieste (Italy).
A STUDY OF MASS ACCRETION IN ALGOL FROM HIGH RESOLUTION IUE SPECTRA c90
H. Cugier (Wroclaw Astronomical Observatory, Poland) and P. Molaro *In* ESA 4th European IUE Conf. Jul. 1984 p 415-418 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

High resolution IUE spectra of Algol taken in 1978, 1979 and 1983 are analyzed. Variable additional absorption components of Mg II, A1 III, C II and Si IV resonance lines are detected. The presence of Si IV lines is a clear indication of a high temperature region in the system. The observations are interpreted in terms of a variable mass accretion process. A significant deficiency of carbon in Algol, i.e., 0.06 of the solar value is shown. Author (ESA)

N84-35214# Osservatorio Astronomico, Trieste (Italy).
OBSERVED PARTICULARITIES DURING THE ECLIPSE OF EPSILON AURIGAE c89
Steno Ferluga (Trieste University) and Margherita Hack *In* ESA 4th European IUE Conf. Jul. 1984 p 419-422 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Low and high resolution IUE spectra were used to study the totality phase of the eclipse of Epsilon Aurigae. In the far UV, the peculiar intrinsic variability, produced by a hot companion of the F star, is studied as a function of wavelength and time. In the mid UV, the phase-dependence of lines is examined at high resolution, showing the existence of normal and peculiar features. Unexpected mideclipse brightening, discovered photometrically in the visible, is detected also in the UV continuum. Author (ESA)

N84-35215*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EGRESS SPECTRA OF THE NEW ECLIPSING SUPERGIANT 22 VULPECULAE c89
Thomas B. Ake, III (Computer Sciences Corp.), Sidney B. Parsons (Computer Sciences Corp.), and Yoji Kondo *In* ESA 4th European IUE Conf. Jul. 1984 p 423-425 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01 CSCL 03A

The G-type primary in the single-lined spectroscopic binary 22 Vul (HD 192713, Gp3 Ib-II, period 249 days) was found by IUE to eclipse its recently identified B9 main sequence companion. The system thus joins Zeta Aurigae systems in which a hot dwarf provides a probe of extended atmospheres by going behind a cool supergiant. The IUE data were obtained at scattered dates following two conjunctions. Outside of eclipse, a wind from the system with terminal velocity of 300 k/sec is conspicuous in the Mg II lines. Enhanced Fe II absorption seen well away from geometrical eclipse implies an extensive envelope around the G star. There is a close correspondence between the 22 Vul spectra and those of interacting binaries, suggesting common properties due to relatively dense, warm plasmas in these systems. Author (ESA)

N84-35216# Milan Univ. (Italy). Dipt. di Fisica.
PRELIMINARY RESULTS OF COORDINATED OPTICAL UV AND X-RAY OBSERVATIONS OF MAGNETIC WHITE DWARFS IN BINARIES c74
L. Maraschi, K. Beuermann (Technische Universitaet, Berlin), J. M. Bonnet-Bidaud (Centre d'Etudes Nucleaires, Saclay, France), P. A. Charles (Oxford University), L. Chiappetti (ESOC, Darmstadt, West Germany), G. Hammerschlag (Astronomical Institute, Amsterdam), I. D. Howarth (University College, London), C. Motch (Observatoire de Besancon, France), M. Mouchet (Observatoire de Paris-Meudon, France), J. Osborne (ESOC, Darmstadt, West Germany) et al *In* ESA 4th European IUE Conf. Jul. 1984 p 427-430 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The magnetic white dwarfs E1405-451, E1013-477, E2003+225, and E2215-086 were observed by IUE, EXOSAT and ground based facilities. The UV spectra and X-ray light curves are discussed. Author (ESA)

N84-35217# Observatoire de Paris-Meudon (France).
ULTRAVIOLET ORBITAL VARIABILITY OF THE INTERMEDIATE POLARS c90
M. Mouchet and J. M. Bonnet-Bidaud (Centre d'Etudes Nucleaires, Saclay, France) *In* ESA 4th European IUE Conf. Jul. 1984 p 431-434 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The variability with orbital phase of the ultraviolet spectrum of the intermediate polars 2A0526-328 (TV Col), 3A0729+103,

4U1849-31 (V1223 Sgr), H2215-086 and H2252-035 (Ao Psc) is analyzed. Intermediate polars are suggested to be close X-ray binaries with a weakly magnetized white dwarf, in which an accretion column and an accretion disk could exist. The presence of an ultraviolet orbital modulation of the continuum and emission lines is discussed in terms of an X-ray heating. Other variable contributions are also present and affect the detection of the orbital modulation. Author (ESA)

N84-35218# Southampton Univ. (England). Dept. of Physics.
PERIODICITY SEARCHES WITH IUE: STUDIES OF PULSATING GALACTIC X-RAY SOURCES c89
M. J. Coe, B. J. Payne, and F. Giovannelli (CNR, Frascati, Italy) *In* ESA 4th European IUE Conf. Jul. 1984 p 435-438 refs Sponsored by UK Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE was used in a trailing mode to obtain time-resolved spectra of regularly pulsating sources. Multiple synchronized trails were carried out so that the resulting image represents one complete pulse period across the trail. The data were analyzed using the maximum entropy technique to search for significant variations in the flux from the source. The problems associated with the process are discussed, together with the results from observations of the galactic X-ray sources Vela X-1 and A0535+26. Author (ESA)

N84-35219# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica.
COORDINATED X-RAY, ULTRAVIOLET, OPTICAL, AND INFRARED OBSERVATIONS OF THE TRANSIENT SOURCE A0535+26 c89
F. Giovannelli, M. Ferrari-Toniolo, P. Persi, C. Bartolini (Bologna University), A. Guarnieri (Bologna University), A. Piccioni (Bologna University), E. L. vanDessel (Observatoire Royal de Belgique), M. Burger (Vrije University, Brussels), C. deLoore (Vrije University, Brussels), G. S. Bisnovatyi-Kogan (Academy of Sciences, Moscow) et al IN ESA 4th European IUE Conf. Jul. 1984 p 439-442 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Data of A 0535+26/HDE 245770 from IR, optical, UV and X wavelengths before and after one of the strongest X-ray outbursts, expected on the basis of the 111-day periodicity of this source and detected by the ASTRON satellite on February 1, 1984 are presented. The IUE observations performed on Nov 10, 1983 and Jan 23, 1984 are entirely compatible with earlier measurements. Optical spectra taken immediately before the X-ray outburst show H gamma in absorption and H alpha in weakened emission. In September and in January 1984 before the X-ray outburst the star presents diminished IR excess. Mass loss is discussed. Author (ESA)

N84-35220# Amsterdam Univ. (Netherlands). Inst. of Astronomy.
EVIDENCE FOR VARIATIONS IN THE PHASE-DEPENDENT IONIZATION STRUCTURE OF THE STELLAR WIND IN VELA X-1 c90
M. vanderKlis and G. Hammerschlag-Hensberge *In* ESA 4th European IUE Conf. Jul. 1984 p 443-447 refs Sponsored by Netherlands Organization of Research (ZWO) (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Results of high resolution IUE observations of Vela X-1 between Feb 16 and 22, 1984 are reported. The UV spectra were obtained simultaneously with EXOSAT observations of the source. Preliminary X-ray data are presented. The ionization structure of the stellar wind, as diagnosed by the shape of the Si IV resonance line profiles near binary phase 0.5, shows a clear difference with respect to previous observations. Author (ESA)

N84-35221# University Coll., London (England). Dept. of Physics and Astronomy.
IUE OBSERVATIONS OF THE X-RAY BINARY A0538 66: RECENT RESULTS ON A REMARKABLE RECURRENT c89
Ian D. Howarth *In* ESA 4th European IUE Conf. Jul. 1984 p 449-451 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Four characteristic states are identified for A0538-66: off state, MBOL = -6.2; intermediate, MBOL = -5.4; interoutburst on state, MBOL = -5.4; outburst, MBOL < 5.4. All observed UV spectra can be classified according to this scheme. Model fits show that off state luminosity is significantly greater than the interoutburst on state value. Author (ESA)

N84-35222# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Space Research Group.
SEARCH FOR EXOTIC MOLECULES IN BRIGHT COMETS c89
C. B. Cosmovici, L. Biermann (Max-Planck Institut fuer Astrophysik, Garching, West Germany), and Rh. Luest (Max-Planck Institut fuer Astrophysik, Garching, West Germany) *In* ESA 4th European IUE Conf. Jul. 1984 p 455-457 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Candidate molecural features in bright new comets for observation by IUE ar listed. Spectral ranges are provided. Author (ESA)

N84-35223# Kent Univ., Canterbury (England). Space Sciences Lab.
ANALYSIS OF HYDROXYL DATA FROM COMET AUSTIN 1982G c91
Max K. Wallis, Wiliam C. Carey, David W. Hughes (Sheffield University, UK), and William M. Burton (Science Research Council, Chilton, UK) *In* ESA 4th European IUE Conf. Jul. 1984 p 459-462 refs Sponsored by UK Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Low resolution IUE SWP and LWR images of Comet Austin covering three weeks pre-perihelion and one post-perihelion are discussed. The OH(1-0) band intensities agree with theoretical calculations relative to the (0-0) band, but observed (1-1) intensities tend to be higher. Scans within the LWR slit augmented by SAP allow determination of OH-parent scale lengths at 34,000 km, significantly shorter than used for H2O. Rederived source strengths, lower by a factor 2 when this shorter scale is used, still increase steeply pre-perihelion (index around -3.6 at 0.9AU) comparable to comet Bradfield 1979X, and drop off more sharply by 1.5AU post-perihelion, implying a nucleus composition much less volatile than H2O ice. Author (ESA)

N84-35224*# European Space Agency, Madrid (Spain). ESA Satellite Tracking Station.
THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE): SIX YEARS IN ORBIT c15
Juergen Faelker *In its* 4th European IUE Conf. Jul. 1984 p 465-468 refs Sponsored in part by NASA and British Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Spacecraft and scientific instrument status of the International Ultraviolet Explorer mission at 6 yr in orbit is discussed. The satellite has been in continuous operations since January 26, 1978 and continues to support science operations normally and effectively in its 7 th year of successful in-orbit operation. Spacecraft and scientific instrument design requirements and goals are met. Design lifetime of the hardware is 3 yr with a goal, including the sizing of consumables and degradable hardware, of 5 yr. Author (ESA)

N84-35225# Osservatorio Astronomico, Trieste (Italy).
STANDARD STARS: AUTOMATIC LINE IDENTIFICATION OF IUE HIGH RESOLUTION SPECTRA c89
M. Ramella, F. Castelli, M. L. Malagnini, C. Morossi, and F. Pasian *In* ESA 4th European IUE Conf. Jul. 1984 p 469-471 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

An automatic line identification procedure of IUE high resolution

spectra, and its application to the SWP 3582 image of the B2.5 IV star HD 35708 are outlined. The first step is the automatic search for features of the observed spectrum which could be true absorption lines. The second step calculates the central intensities of a list of lines resulting from the compilation of many sources, starting from a model atmosphere interpolated using the Kurucz models. The output of this step is a list of computed lines with a central depth greater than a certain threshold value, chosen in correspondance to that fixed during the first step. The list is compared with that containing the wavelength ranges of the observed features, giving an atlas of observed lines, identified with their main contributors. Author (ESA)

N84-35226# Science Research Council, Chilton (England). Astrophysics Group.
IUE DATA REDUCTION FACILITIES ON STARLINK c82
Gordon E. Bromage *In* ESA 4th European IUE Conf. Jul. 1984 p 473-475 (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The Starlink Software Collection implemented throughout Starlink and on other Vax (VMS) systems for IUE data reduction is described. It is freely available to any astronomical institute on request. The IUEDR program handles spectrum extraction and calibration. A display/plotting program DIPSO is available. Image processing, interstellar absorption analysis, and graphics packages were constructed. Author (ESA)

N84-35227*# Computer Sciences Corp., Silver Spring, Md. Astronomy Programs.
THE NASA IUE DATA ANALYSIS FACILITIES c82
R. Thompson and Nancy Remage Evans *In* ESA 4th European IUE Conf. Jul. 1984 p 477-479 refs Sponsored in part by NASA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01 CSCL 05B

The NASA facilities for handling IUE data are introduced. Hardware and software are described. Author (ESA)

N84-35228*# University Coll., London (England).
THE ULTRAVIOLET ASTRONOMY MISSION: COLUMBUS c89
R. Wilson *In* ESA 4th European IUE Conf. Jul. 1984 p 483-487 refs Sponsored in part by NASA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

An ultraviolet astronomy mission (Columbus) is described. It exploits the spectral region between 900 and 1200A, which is extremely rich in containing the Lyman lines of hydrogen and deuterium and the Lyman band of their molecules, together with the resonance lines of many important ions. High resolving power and high sensitivity provide a unique capability for studying the brightest members of neighboring galaxies, the HeI and HeII absorption systems in quasars out to a red shift of 2, and the halos of intervening galaxies. Complementary focal plane instruments are planned in order to allow observations to longer (2000A) and shorter (100A) wavelengths. This wide coverage embraces the resonance lines of all the cosmically abundant elements and a wide range of temperature zones up to 100 million K.
Author (ESA)

N84-35229*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INSTRUMENTATION STUDIES FOR FUSE-COLUMBUS c89
John F. Osantowski *In* ESA 4th European IUE Conf. Jul. 1984 p 489-493 refs Presented at the 2nd NASA-ESA Ultraviolet Workshop, Frascati, Italy, 14-15 May 1984 Sponsored by NASA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01 CSCL 03A

Telescope and spectrograph design for the Columbus ultraviolet astronomy satellite are described. A 1m mirror two-piece glancing incidence telescope design is suggested. A classical Rowland spectrograph is potentially the only design with efficiencies great enough to deliver the 100 sqcm net collecting area specified from a manageable telescope. Author (ESA)

N84-35230# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica.
IUE INTEGRATED SPECTRA OF GALACTIC GLOBULAR CLUSTERS c89
V. Caloi, V. Castellani (Rome University), and D. Galluccio (Rome University) *In* ESA 4th European IUE Conf. Jul. 1984 p 497-501 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The IUE spectra of the central region of galactic globular clusters are presented. The influence on the observed energy distribution of UV-bright objects is accounted for by a spatial distribution analysis. Results are compared with ANS observations. Author (ESA)

N84-35231# Rome Univ. (Italy). Dept. di Fisica.
SEARCH FOR THE RADIATIVE DECAY OF A COSMIC RELIC PARTICLE WITH IUE c93
F. Bochicchio, G. Auriemma, A. Frenkel, and F. Massa *In* ESA 4th European IUE Conf. Jul. 1984 p 503-505 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

The UV background at < or = 45 deg was obtained from low resolution large aperture IUE spectra. Hot interstellar gas emission lines, and a component of the continuum with a power low distribution, as expected from the decay of a primordial relic light particle are identified. From this fit a candidate mass for the neutrino of 14.8 + or - 0.1 eV and a lifetime of 10 to the 16th power yr are obtained. The probability that statistical fluctuations could mimic this signal is estimated to be < 2%. Cosmology and particle physics implications of the results are discussed.
Author (ESA)

N84-35232# Leiden Univ. (Netherlands). Lab. of Astrophysics.
A COMPREHENSIVE ULTRAVIOLET EXTINCTION STUDY: GRAIN MODEL AND GRAIN EVOLUTION IMPLICATIONS c90
G. Chlewicki, J. M. Greenberg, S. Aiello (Florence University), B. Barsella (Pisa University), P. Patriarchi (Osservatorio Astrofisico di Acreti, Florence), and M. Perionotto (Osservatorio Astrofisica di Acreti, Florence) *In* ESA 4th European IUE Conf. Jul. 1984 p 507-510 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

Ultraviolet extinction curves for about 110 stars were derived from IUE spectra. At least 90% of these exhibit a uniform shape at 1800 A, confirming earlier results. Strong variations in the amount of far ultraviolet (FUV) extinction and in the hump occur systematically in young OB associations. In the diffuse medium the correlation with visual extinction is much stronger for the hump than for the FUV. The data support the trimodal grain model.
Author (ESA)

N84-35233# Science Research Council, Chilton (England). Astrophysics Group.
PHASE-DEPENDENT STELLAR WIND ABSORPTIONS IN INTERACTING WOLF-RAYET BINARIES c90
G. E. Bromage *In* ESA 4th European IUE Conf. Jul. 1984 p 511-513 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

A zone of apparent depletion of moderately ionized wind absorbers was detected by IUE around the secondary in single-lined Wolf-Rayet spectroscopic binaries. There is a superficial analogy with the Hatchett-McCray effect predicted and observed in the spectra of massive X-ray binaries. For WR SB1's such data may be circumstantial evidence in favor of compact secondaries.
Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N84-35234*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

X-RAY SPECTRA OF CLUSTERS OF GALAXIES
R. F. Mushotzky May 1984 14 p refs Presented at the Conf. on Non Thermal and Very High Temp. Phenomena in X-Ray Astronomy, Rome, Dec. 1983
(NASA-TM-86115; NAS 1.15:86115) Avail: NTIS HC A02/MF A01 CSCL 03A

The X-ray emission from luminous clusters of galaxies is dominated by thermal bremsstrahlung from an intergalactic medium. The central density of the gas is strongly correlated with the X-ray surface brightness. The X-ray surface brightness S(sigma) of many clusters is well modeled by a law of the form S(sigma) alpha S(o) [1 + R(2)/A(2)] to the minus 3 beta + 1/2 power with beta approximately equal to 0.66. However, this model does not fit the X-ray spectral or optical galaxy counts well. In clusters with cooling flows in their center there is a strong correlation between the cooling rates of X-ray emitting material and optical H alpha emission. It is not clear, at present, what percentage of the virial mass of the cluster is in hot gas but if beta = 0.66, it is possible for the values to be of the order of 1/2. Spatially resoled X-ray spectroscopy is necessary to determine this value with any accuracy. R.S.F.

N84-35235*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SIGNAL-TO-NOISE RATIO FOR THE WIDE FIELD-PLANETARY CAMERA OF THE SPACE TELESCOPE
D. E. Zissa Oct. 1984 12 p refs
(NASA-TM-86472; NAS 1.15:86472) Avail: NTIS HC A02/MF A01 CSCL 03A

Signal-to-noise ratios for the Wide Field Camera and Planetary Camera of the Space Telescope were calculated as a function of integration time. Models of the optical systems and CCD detector arrays were used with a 27th visual magnitude point source and a 25th visual magnitude per arc-sq. second extended source. A 23rd visual magnitude per arc-sq. second background was assumed. The models predicted signal-to-noise ratios of 10 within 4 hours for the point source centered on a signal pixel. Signal-to-noise ratios approaching 10 are estimated for approximately 0.25 x 0.25 arc-second areas within the extended source after 10 hours integration. Author

N84-34497*# Perkin-Elmer Corp., Danbury, Conn.
HUBBLE SPACE TELESCOPE COMPONENT QUALIFICATION UTILIZING A RESIDUAL GAS ANALYZER Abstract Only
Alvin H. Westfall *In* NASA. Goddard Space Flight Center 13th Space Simulation Conf. 1984 p 372 (For primary document see N84-34468 24-18)
Avail: NTIS HC A13/MF A01 CSCL 03A

N84-35136# Royal Greenwich Observatory, Herstmonceux (England).
ULTRAVIOLET OBSERVATIONS OF NORMAL GALAXIES
M. A. J. Snijders *In* ESA Fourth European IUE Conf. Jul. 1984 p 3-9 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35137*# Space Telescope Science Inst., Baltimore, Md.
ULTRAVIOLET STUDIES OF THE INTERSTELLAR MEDIUM
J. C. Blades *In* ESA Fourth European IUE Conf. Jul. 1984 p 11-20 refs Sponsored by NASA and ESA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35138# Consiglio Nazionale delle Ricerche, Bologna (Italy). Ist. di Radioastronomia.
SUPERNOVAE
N. Panagia *In* ESA Fourth European IUE Conf. Jul. 1984 p 21-24 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35139*# Heidelberg Univ. (West Germany). Inst. fuer Theoretische Astrophysik.
CORONA MODELS TESTED WITH IUE AND EINSTEIN OBSERVATIONS
Reiner Hammer and Jeffrey L. Linsky (Joint Inst. for Lab. Astrophysics) *In* ESA Fourth European IUE Conf. Jul. 1984 p 25-32 refs (For primary document see N84-35135 24-88)
(Grants NGL-06-003-057; NAG5-82; DFG-SFB-132)
Avail: NTIS HC A23/MF A01

N84-35140# Technische Univ., Munich (West Germany).
SPECTRAL ANALYSIS OF (VERY) HOT STARS: METHODS AND RESULTS
R. P. Kudritzki *In* ESA Fourth European IUE Conf. Aug. 1984 p 33-41 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35143# Royal Observatory, Edinburgh (Scotland).
STUDY OF HOT SPOT GALAXIES
K. Nandy and G. I. Thompson *In* ESA Fourth European IUE Conf. Jul. 1984 p 65-68 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35145# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain).
ULTRAVIOLET STUDY OF THE STELLAR POPULATION OF THE GIANT EXTRAGALACTIC HII REGION NGC 604
Sanz Fernandez deCordoba and P. Benvenuti (Space Telescope-European Coordinating Facility Garching, West Germany) *In* ESA Fourth European IUE Conf. Jul. 1984 p 73-75 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35146# Science Research Council, Chilton (England). Astrophysics Group.
THE BROAD ABSORPTION LINE REGION IN NGC 4151
G. E. Bromage, A. Boksenberg (Royal Greenwich Observatory), J. Clavel (Observatoire de Meudon, France), M. H. Demoulin-Ulrich (European Southern Observatory), A. Elvius (Stockholm Univ.), M. V. Penston (Royal Greenwich Observatory), G. C. Perola (Rome Univ.), M. Pettini (Royal Greenwich Observatory), and M. A. J. Snijders (Royal Greenwich Observatory) *In* ESA Fourth European IUE Conf. Jul. 1984 p 77-79 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35147# Observatoire de Paris-Meudon (France). Lab. d'Astrophysique 173.
THE SEYFERT 1 GALAXY NGC 4593 (3). VERY RAPID VARIATIONS OF ITS FAR UV SPECTRUM AND THEIR IMPLICATIONS
J. Clavel *In* ESA Fourth European IUE Conf. Jul. 1984 p 83-89 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35148# Goettingen Univ. (West Germany).
IUE OBSERVATIONS OF MULTIPLE NUCLEUS GALAXIES
W. Kollatschny and K. J. Fricke *In* ESA Fourth European IUE Conf. Jul. 1984 p 91-95 refs (For primary document see N84-35135 24-88)
(Grant DFG-Fr-325/21-1)
Avail: NTIS HC A23/MF A01

N84-35149# European Space Agency, Madrid (Spain).
THE 1978 - 1984 FADING OF THE SEYFERT 1 GALAXY F-9
W. Wamsteker, R. Gilmozzi, P. Benvenuti, A. Cassatella, B. J. M. Hassall, A. Talavera, A. W. Harris (Science and Engineering Research Council, Madrid), H. Netzer (Texas Univ., Austin), D. Wills (Texas Univ., Austin), and B. J. Wills (Texas Univ., Austin) *In its* Fourth European IUE Conf. Jul. 1984 p 97-99 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35150# Cambridge Univ. (England). Inst. of Astronomy.
MCG-2-58-22 = Mkn 926. A HIGH LUMINOSITY SEYFERT GALAXY WITH TWO DISTINCT BROAD LINE COMPONENTS
Michael Jones and Martin Ward *In* ESA Fourth European IUE

Conf. Jul. 1984 p 101-105 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35151# Consiglio Nazionale delle Ricerche, Bologna (Italy).
MULTIFREQUENCY OBSERVATIONS OF THREE ACTIVE GALAXIES
L. Bassani, M. J. Coe (Southampton Univ., England), R. Clement (Southampton Univ., England), A. J. Dean (Southampton Univ., England), G. DiCocco, B. Elsmore (Cambridge Univ., England), M. Ferrari-Toniolo, F. Giovannelli, J. MacDougall (Science Research Council, Didcot, England), P. Persi et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 107-110 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35152# Consiglio Nazionale delle Ricerche, Milan (Italy). Inst. di Fisica Cosmica.
MULTIFREQUENCY OBSERVATIONS OF ACTIVE GALACTIC NUCLEI
E. G. Tanzi, L. Chiappetti, J. Danziger (European Southern Observatory, Garching, West Germany), R. Falomo (Osservatorio di Brea, Italy), D. Maccagni, L. Maraschi, A. Treves, and W. Wamsteker (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 111-117 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35153# Milan Univ. (Italy). Dipt. di Fisica.
UV OBSERVATIONS ON THE VARIABLE QUASAR PG 1351+64
A. Treves, J. E. Drew (Cambridge Univ., England), R. Falomo (Osservatorio di Brea, Italy), L. Maraschi, E. G. Tanzi (CNR, Milan), and R. Wilson (University Coll., London) *In* ESA Fourth European IUE Conf. Jul. 1984 p 119-124 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35154*# Kitt Peak National Observatory, Tucson, Ariz.
QUASARS AS PROBES OF THE INTERGALACTIC MEDIUM
Richard F. Green and Jill Bechtold (Arizona Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 125-128 refs (For primary document see N84-35135 24-88)
(Grant NAG5-38)
Avail: NTIS HC A23/MF A01 CSCL 03A

N84-35156# Osservatorio Astronomico, Trieste (Italy).
USE OF HIGH RESOLUTION IUE SPECTRA OF MG 2 IN COOL STARS TO PROBE THE LOCAL INTERSTELLAR MEDIUM
P. Molaro, J. E. Beckman (Queen Mary Coll.), L. Crivellari, M. L. Franco (Instituto de Astronomia y Fisica del Espacio), and G. Vladilo *In* ESA Fourth European IUE Conf. Jul. 1984 p 139-143 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35160# Observatoire de Paris (France).
INTERSTELLAR LINES IN HIGH RESOLUTION IUE SPECTRA OF RUN-AWAY B TYPE STARS
J. Barger, R. Freire-Ferrero, A. M. Fringant, M. Gerbaldi, and N. Morguleff *In* ESA Fourth European IUE Conf. Jul. 1984 p 161-166 refs Prepared in cooperation with Observatoire de Strasbourg, Paris-Sud Univ. and Institut d'Astrophysique (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35162# Kapteyn Astronomical Lab., Groningen (Netherlands).
INTERSTELLAR AND NEBULAR ABSORPTION LINES IN PLANETARY NEBULAE
T. H. Pwa, J. E. Mo, and S. R. Pottasch *In* ESA Fourth European IUE Conf. Jul. 1984 p 175-178 refs Sponsored by Netherlands Research Foundation (ZWO) (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35164# Tuebingen Univ. (West Germany). Inst. of Astronomy.
UV-BRIGHT STARS IN GALACTIC GLOBULAR CLUSTERS, THEIR FAR-UV SPECTRA AND THEIR CONTRIBUTION TO THE GLOBULAR CLUSTER LUMINOSITY
Klaas S. deBoer *In* ESA Fourth European IUE Conf. Jul. 1984 p 185-186 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35165# Institut d'Astrophysique, Paris (France).
ULTRAVIOLET FLUXES OF BLUE STRAGGLER STARS
M. Gerbaldi and N. Morguleff *In* ESA Fourth European IUE Conf. Jul. 1984 p 187-190 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35166*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
ULTRAVIOLET AND OPTICAL OBSERVATIONS OF METAL DEFICIENT RED GIANTS AND CHROMOSPHERIC MODELS
A. K. Dupree, E. H. Avrett, L. Hartmann, and G. Smith *In* ESA Fourth European IUE Conf. Jul. 1984 p 191-195 refs (For primary document see N84-35135 24-88)
(Grants NAGW-511; NAG5-87)
Avail: NTIS HC A23/MF A01 CSCL 03A

N84-35168# Catania Univ. (Italy). Istituto di Astronomia.
EMISSION LINES IN THE UV SPECTRUM OF ALPHA TAU
S. Catalano, C. Blanco, L. Bruca (International School for Advanced Studies), and E. Marilli (Catania Astrophysical Observatory, Italy) *In* ESA Fourth European IUE Conf. Jul. 1984 p 203-206 refs Sponsored by CNR and Ministero Pubblica Istruzione (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35169# Observatoire de Strasbourg (France).
SEARCH FOR CHROMOSPHERIC INDICATORS IN A DWARF STARS
R. Freire-Ferrero and A. Talavera (ESTEC, Madrid) *In* ESA Fourth European IUE Conf. Apr. 1984 p 207-210 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35170# Observatoire de Strasbourg (France).
THE Mg 2 LINES IN A DWARF STARS
R. Freire-Ferrero, A. Talavera (ESTEC, Madrid), and P. Gouttebroze (CNRS, Verrieres-le-Buisson, France) *In* ESA Fourth European IUE Conf. Jul. 1984 p 211-215 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35171# Observatoire de Strasbourg (France).
THE SEARCH FOR SUPERIONIZATION LINES IN A DWARF STARS
R. Freire-Ferrero and A. Talavera (ESTEC, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 217-221 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35172# Osservatorio Astronomico, Trieste (Italy).
IUE SPECTRA OF THREE A0 V STARS ROTATING CLOSE TO THEIR BREAK-UP VELOCITY: HD 119921, HD 129685, HD 181296
P. Molaro, C. Morossi, M. Ramella, and M. Franco (Instituto de Astronomia y Fisica del Espacio) *In* ESA Fourth European IUE Conf. Jul. 1984 p 223-225 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35174# Royal Greenwich Observatory, Hailsham (England).
A UV GLIMPSE OF T TAURI STARS
M. T. V. T. Lago (Grupo de Matematica Aplicada), M. V. Penston, and R. Johnstone (Sussex University, UK) *In* ESA Fourth European IUE Conf. Jul. 1984 p 233-237 refs Sponsored by Fundacao

Calouste Gulbenkian (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35176# Armagh Observatory (Northern Ireland).
IUE OBSERVATIONS OF BY DRACONIS
C. J. Butler, J. G. Doyle, A. D. Andrews, P. B. Byrne, J. L. Linsky (Joint Inst. for Laboratory Astrophysics), T. Simon (Joint Inst. for Laboratory Astrophysics), N. C. Marstad (Joint Inst. for Laboratory Astrophysics), M. Rodono (Catania Univ.), V. Pazzani (Catania Univ.), and C. Cutispoto (Catania Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 243-246 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35177# Catania Univ. (Italy). Ist. di Astronomia.
COORDINATED IUE AND GROUND-BASED OBSERVATIONS OF ACTIVE STARS: FLARE EVENTS ON YZ CMI, V 1005 ORI, AD LEO AND AR LAC
M. Rodono, G. Cutispoto, S. Catalano, J. L. Linsky (Joint Inst. for Laboratory Astrophysics), D. M. Gibson (Joint Inst. for Laboratory Astrophysics), A. Brown (Joint Inst. for Laboratory Astrophysics), B. M. Haisch (Lockheed Aircraft Corp., Palo Alto, Calif.), C. J. Butler (Armagh Observatory), P. B. Byrne (Armagh Observatory), A. D. Andrews (Armagh Observatory) et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 247-252 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35178# Observatoire de Strasbourg (France).
STATISTICAL CLASSIFICATION OF IUE STELLAR SPECTRA BY THE VARIABLE PROCRUSTEAN BED (VPB) APPROACH
A. Heck, D. Egret, Ph. Nobelis (Strasbourg Univ.), and J. C. Turlot (Strasbourg Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 257-261 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35179# European Space Agency, Madrid (Spain). IUE Observatory.
IUE LOW DISPERSION SPECTRA REFERENCE ATLAS
B. J. M. Hassall, A. Heck, A. Talavera, D. Egret (Observatoire de Strasbourg), C. Jaschek (Observatoire de Strasbourg), and M. Jaschek (Observatoire de Strasbourg) *In its* Fourth European IUE Conf. Jul. 1984 p 263-266 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35180# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
IUE-HIGH RESOLUTION OF ONV-STARS
D. Schoenberner, K. P. Simon (Technische Univ., Munich), and R. P. Kudritzki (Technische Univ., Munich) *In* ESA Fourth European IUE Conf. Jul. 1984 p 267-271 refs Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35181# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
SPECTRAL ANALYSIS OF HELIUM POOR HOT SUBDWARFS
U. Heber and K. Hunger *In* ESA Fourth European IUE Conf. Jul. 1984 p 273-277 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35182# Queen Mary Coll., London (England). Dept. of Physics.
AN ANALYSIS OF THE HELIUM-WEAK STARS HD 144334
H. J. Walker and A. E. Lynas-Gray (University Coll., London) *In* ESA Fourth European IUE Conf. Jul. 1984 p 279-283 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35185# Observatoire de Paris (France).
POSSIBLE IDENTIFYING CHARACTERISTICS OF Be STARS
V. Doazan and R. N. Thomas (Institut d'Astrophysique) *In* ESA Fourth European IUE Conf. Jul. 1984 p 297-300 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35186# Osservatorio Astronomico, Trieste (Italy).
AN IUE STUDY OF Be STARS WITH Fe 2 EMISSIONS IN THE VISIBLE
P. L. Selvelli (Osservatorio Nacional, Rio de Janeiro) and F. X. DeAraujo *In* ESA Fourth European IUE Conf. Jul. 1984 p 301-305 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35187# Lund Univ. (Sweden). Dept. of Physics.
NEW Fe 2 LINES IN IUE SPECTRA OF STARS
S. Johansson *In* ESA Fourth European IUE Conf. Jul. 1984 p 307-308 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35188# Observatoire de Marseille (France).
THE ULTRAVIOLET SPECTRUM OF STARS HAVING OPTICAL Fe 2 EMISSION LINES
G. Muratorio, M. Friedjung (Institut d'Astrophysique), and R. Viotti (CNR, Frascati, Italy) *In* ESA Fourth European IUE Conf. Jul. 1984 p 309-313 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35190# University Coll., London (England). Dept. of Physics and Astronomy.
OBSERVATIONS OF EXTENSIVE VARIABILITY IN THE ULTRAVIOLET SPECTRUM OF xi PER
R. K. Prinja, H. F. Henrichs (Amsterdam Univ.), I. D. Howarth, and M. vanderKlis (Amsterdam Univ.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 319-322 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35191# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica Spaziale.
ULTRAVIOLET AND OPTICAL OBSERVATIONS OF THE CYGNUS OB2 ASSOCIATION: THE STAR 8A
F. Giovannelli, C. Bartolini (Bologna Univ.), C. Cacciari (Bologna Univ.), A. Guarnieri (Bologna Univ.), and A. Piccioni *In* ESA Fourth European IUE Conf. Jul. 1984 p 323-324 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35193# Kapteyn Astronomical Lab., Groningen (Netherlands).
HOT CENTRAL STARS IN PLANETARY NEBULAE
J. Mo, T. H. Pwa, and S. R. Pottasch *In* ESA Fourth European IUE Conf. Jul. 1984 p 329-331 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35198# Tuebingen Univ. (West Germany). Inst. fuer Astronomische.
OPTICAL AND ULTRAVIOLET OBSERVATIONS OF FK COMAE STARS
L. Bianchi (Osservatori Astronomico, Turin), M. Grewing, N. Appelmann, and A. Cassatella (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 355-358 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35199# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
COORDINATED X-RAY AND ULTRAVIOLET OBSERVATIONS OF RU LUPI
F. Giovannelli (CNR, Frascati, Italy), G. S. Bisnovatyi-Kogan, I. M. Golynskaya, V. G. Kurt, S. A. Lanzin (Lenin State Pedagogical Inst.), T. A. Mizyakina, E. Yu. Shafer, V. M. Shamolin, E. K. Sheffer, A. S. Smirnoff et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 359-361 refs (For primary document see N84-35135

24-88)
Avail: NTIS HC A23/MF A01

N84-35200# Royal Observatory, Edinburgh (Scotland).
THE HYDROGEN-DEFICIENT IRREGULAR VARIABLE STAR V348 SGR
N. Kameswararao and K. Nandy (Indian Inst. of Astrophysics, Bangalore) *In* ESA Fourth European IUE Conf. Jul. 1984 p 363-366 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35202# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
UV AND OPTICAL SPECTROSCOPY OF CLASSICAL NOVAE DURING OUTBURST
H. Drechsel and J. Rahe *In* ESA Fourth European IUE Conf. Jul. 1984 p 371-375 refs (For primary document see N84-35135 24-88)
(Grants DFG-Dr-131/4-1; DFG-131/5-1)
Avail: NTIS HC A23/MF A01

N84-35207# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
UV AND OPTICAL OBSERVATIONS OF THE NOVALIKE OBJECT V3885 SGR
K. Haug, H. Drechsel, and J. Rahe *In* ESA 4th European IUE Conf. Jul. 1984 p 395-397 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35210# Osservatorio Astronomico, Trieste (Italy).
THE SPECTRUM OF THE SYMBIOTIC STAR CH CYGNI IN JANUARY 1984
C. Boehm, M. Hack, and M. Persic (International School for Advanced Studies, Trieste, Italy) *In* ESA 4th European IUE Conf. Jul. 1984 p 407-408 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35212# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
UV AND OPTICAL SPECTROSCOPY OF W SERPENTIS OBJECTS
W. Strupat, H. Drechsel, and J. Rahe *In* ESA 4th European IUE Conf. Jul. 1984 p 411-413 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35214# Osservatorio Astronomico, Trieste (Italy).
OBSERVED PARTICULARITIES DURING THE ECLIPSE OF EPSILON AURIGAE
Steno Ferluga (Trieste University) and Margherita Hack *In* ESA 4th European IUE Conf. Jul. 1984 p 419-422 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35215*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EGRESS SPECTRA OF THE NEW ECLIPSING SUPERGIANT 22 VULPECULAE
Thomas B. Ake, III (Computer Sciences Corp.), Sidney B. Parsons (Computer Sciences Corp.), and Yoji Kondo *In* ESA 4th European IUE Conf. Jul. 1984 p 423-425 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01 CSCL 03A

N84-35218# Southampton Univ. (England). Dept. of Physics.
PERIODICITY SEARCHES WITH IUE: STUDIES OF PULSATING GALACTIC X-RAY SOURCES
M. J. Coe, B. J. Payne, and F. Giovannelli (CNR, Frascati, Italy) *In* ESA 4th European IUE Conf. Jul. 1984 p 435-438 refs Sponsored by UK Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35219# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica.
COORDINATED X-RAY, ULTRAVIOLET, OPTICAL, AND INFRARED OBSERVATIONS OF THE TRANSIENT SOURCE A0-535+26
F. Giovannelli, M. Ferrari-Toniolo, P. Persi, C. Bartolini (Bologna University), A. Guarnieri (Bologna University), A. Piccioni (Bologna University), E. L. vanDessel (Observatoire Royal de Belgique), M. Burger (Vrije University, Brussels), C. deLoore (Vrije University, Brussels), G. S. Bisnovatyi-Kogan (Academy of Sciences, Moscow) et al IN ESA 4th European IUE Conf. Jul. 1984 p 439-442 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35221# University Coll., London (England). Dept. of Physics and Astronomy.
IUE OBSERVATIONS OF THE X-RAY BINARY A0538 66: RECENT RESULTS ON A REMARKABLE RECURRENT
Ian D. Howarth *In* ESA 4th European IUE Conf. Jul. 1984 p 449-451 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35222# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Space Research Group.
SEARCH FOR EXOTIC MOLECULES IN BRIGHT COMETS
C. B. Cosmovici, L. Biermann (Max-Planck Institut fuer Astrophysik, Garching, West Germany), and Rh. Luest (Max-Planck Institut fuer Astrophysik, Garching, West Germany) *In* ESA 4th European IUE Conf. Jul. 1984 p 455-457 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35225# Osservatorio Astronomico, Trieste (Italy).
STANDARD STARS: AUTOMATIC LINE IDENTIFICATION OF IUE HIGH RESOLUTION SPECTRA
M. Ramella, F. Castelli, M. L. Malagnini, C. Morossi, and F. Pasian *In* ESA 4th European IUE Conf. Jul. 1984 p 469-471 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35228*# University Coll., London (England).
THE ULTRAVIOLET ASTRONOMY MISSION: COLUMBUS
R. Wilson *In* ESA 4th European IUE Conf. Jul. 1984 p 483-487 refs Sponsored in part by NASA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35229*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INSTRUMENTATION STUDIES FOR FUSE-COLUMBUS
John F. Osantowski *In* ESA 4th European IUE Conf. Jul. 1984 p 489-493 refs Presented at the 2nd NASA-ESA Ultraviolet Workshop, Frascati, Italy, 14-15 May 1984 Sponsored by NASA (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01 CSCL 03A

N84-35230# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica.
IUE INTEGRATED SPECTRA OF GALACTIC GLOBULAR CLUSTERS
V. Caloi, V. Castellani (Rome University), and D. Galluccio (Rome University) *In* ESA 4th European IUE Conf. Jul. 1984 p 497-501 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N84-35236 Yale Univ., New Haven, Conn.
CARBON AND NITROGEN ABUNDANCES IN FIELD DWARF

STARS Ph.D. Thesis
John Burton Laird 1983 112 p
Avail: Univ. Microfilms Order No. DA8413097

Intermediate-dispersion spectra of 116 field dwarf stars, plus 10 faint field giants and three Hyades dwarfs, were used to derive carbon and nitrogen abundances relative to iron. Effective temperatures were determined from R-I photometry. Line indices measured from the spectra and Stromgren photometry were calibrated to determine metallicities and surface gravities for all the stars. The C/Fe ratio is solar over the range of metallicity studied. The N/Fe ratio is also constant for the majority of stars indicating that nitrogen production is largely primary. These results are discussed in connection with the chemical evolution of the Milky Way and the sites of C, N, and Fe nucleosynthesis. The results require that C, N, and Fe are produced in stars of similar mass. Current understanding of N production, then, implies that most type I supernovae have intermediate mass progenitors. The nitrogen in the N-enhanced halo stars is very probably primordial, indicating that the interstellar medium at early epochs contained substantial inhomogeneities. Dissert. Abstr.

N84-35237# Oulu Univ. (Finland). Dept. of Astronomy.
NUMERICAL SIMULATIONS OF COLLISIONS IN SELF-GRAVITATING SYSTEMS
J. Lukkari and H. Salo [1983] 28 p refs
Avail: NTIS HC A03/MF A01

The influence of partially elastic collisions, gravitational encounters, and different gravitational potentials is studied in terms of computer simulations involving a ring of 200 identical particles. If the masses of the particles are small, their mutual gravitational attraction is found to produce a decrease in the dispersion of velocities below the collisional equilibrium value, but for heavier particles the dispersion again begins to increase. The vertical component of the force which is produced by the self gravitation of the ring reduces its thickness. The results of the simulations are in good agreement with the predictions of the collisional theory. Author

N84-35238*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TEMPERATURE AND ELEMENTAL ABUNDANCES IN THE ABELL CLUSTER A 576 DERIVED FROM X-RAY OBSERVATIONS
R. Rothenflug (Commissariat a l'Energie Atomique, Saclay, France), L. Vigroux (Commissariat a l'Energie Atomique, Saclay, France), R. F. Mushotzky, and S. S. Holt Sep. 1983 33 p refs Submitted for publication
(NASA-TM-85103; NAS 1.15:85103) Avail: NTIS HC A03/MF A01 CSCL 03B

Results of Einstein solid state spectrometer observations of the central region of Abell 576 combined with HEAO 1 spectra of the total cluster are given. Line emission was detected due to Fe, Si, and S from a hot plasma in the central region. The temperature of the total cluster spectrum may be in conflict with the central temperature. This difference can be explained either if cooling takes place in the center, or if part of the measured emission is due to individual galaxies. If the X-ray emission comes from the intergalactic gas only, there is some difficulty in producing all the silicon observed in the galaxies of A 576. Author

N84-35239# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE 22 GHz CONTINUUM AND SPECTRAL INDEX MAPS OF THE GALACTIC CENTER REGION
C. E. Tateyama, F. M. Strauss, and Z. Abraham Sep. 1984 20 p refs Submitted for publication
(INPE-3275-PRE/599) Avail: NTIS HC A02/MF A01

A map of the Galactic Center region obtained with the Itapetinga radio telescope in the 22 GHz continuum with 4 arc min resolution is presented. Spectral indices between 5 and 22 GHz were obtained for the whole region, and show the existence of nonthermal sources which do not always coincide in position with the maximum emission. It is shown that the region has many of them with shell like structures, which suggests that they may be supernova remnants. E.A.K.

N84-35240*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IMPLICATIONS OF A CLASS OF GRAND UNIFIED THEORIES FOR LARGE SCALE STRUCTURE IN THE UNIVERSE
Q. Shafi (Delaware Univ., Newark) and F. W. Stecker [1983] 13 p refs Submitted for publication
(Contract DE-AC02-73ER-05007)
(NASA-TM-86146; NAS 1.15:86146) Avail: NTIS HC A02/MF A01 CSCL 03B

A class of grand unified theories in which cosmologicaly significant axion and neutrino energy densities arise naturally is discussed. To obtain large scale structure three scenarios are considered: (1) an inflationary scenario; (2) inflation followed by string production; and (3) a non-inflationary scenario with density fluctuations caused solely by strings. Inflation may be compatible with the recent observational indications that mega < 1 on the scale of superclusters, particularly if strings are present. S.B.

N84-35141# Amsterdam Univ. (Netherlands). Institute of Astronomy.
THE STELLAR WIND ENIGMA IN EARLY TYPE STARS: THE HIGH-VELOCITY, NARROW ABSORPTION LINES IN THE UV
Huib Heinrichs *In* ESA Fourth European IUE Conf. Jul. 1984 p 43-54 refs Sponsored by Niels Stensen Foundation (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35142# Osservatorio Astronomico, Trieste (Italy).
IUE IMPACT ON THE STUDIES OF THE ZETA AUR, ALGOL AND W SER INTERACTING BINARY SYSTEMS
M. Hack *In* ESA Fourth European IUE Conf. Jul. 1984 p 55-61 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35144# Institut d'Astrophysique, Paris (France).
FAR UV EXCESS AND GAS CONTENT OF SO GALAXIES
B. Rocca-Volmerange and C. Balkowski (Observatoire de Paris-Meudon, France) *In* ESA Fourth European IUE Conf. Jul. 1984 p 69-72 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35155# Observatoire de Strasbourg (France).
THE INTERSTELLAR ABSORPTION IN THE DIRECTION OF SOME NEARBY A STARS
R. Freire-Ferrero *In* ESA Fourth European IUE Conf. Jul. 1984 p 133-137 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35157# Queens Univ., Belfast (Northern Ireland). Dept. of Pure and Applied Physics.
FURTHER STUDIES OF NEARBY HIGH VELOCITY INTERSTELLAR GAS
B. Bates, W. Brown-Kerr, D. L. Giaretta (Science Research Council, Chilton, UK), and F. P. Keenan *In* ESA Fourth European IUE Conf. Jul. 1984 p 145-149 refs Sponsored by UK Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35158# Science Research Council, Chilton (England).
A GENERAL SURVEY OF THE CORRELATION OF INTERSTELLAR ELEMENT DEPLETION WITH LINE-OF-SIGHT DENSITY INDICATORS
Alan W. Harris, Gordon E. Bromage, and Cecile Gry (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 151-155 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35159# Science Research Council, Chilton (England). Rutherford Appleton Lab.
INTERSTELLAR CHLORINE ABUNDANCE: RESULTS AND IMPLICATIONS OF A LARGE-SCALE SURVEY
Alan W. Harris and Gordon E. Bromage *In* ESA Fourth European IUE Conf. Jul. 1984 p 157-160 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35161# Kapteyn Astronomical Lab., Groningen (Netherlands).
THE INTERSTELLAR MEDIA IN THE SCORPIUS-OPHIUCHUS REGION
T. H. Pwa and S. R. Pottasch *In* ESA Fourth European IUE Conf. Jul. 1984 p 167-173 refs Sponsored by Netherlands Research Foundation (ZWO) (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35163# Tuebingen Univ. (West Germany). Inst. of Astronomy.
THE DIFFUSE INTERSTELLAR MEDIUM IN THE MAGELLANIC CLOUDS (REVIEW)
Klaas S. deBoer *In* ESA Fourth European IUE Conf. Jul. 1984 p 179-182 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35167# Osservatorio Astronomico, Trieste (Italy).
AN UPPER LIMIT TO THE BERYLLIUM ABUNDANCE IN THE POPULATION 2 STAR HD 140283 FROM A HIGH RESOLUION IUE SPECTRUM
P. Molaro, J. E. Beckman, and F. Castelli (Queen Mary Coll.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 197-201 refs Sponsored by Royal Society/Academia dei Lincei (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35173# Observatoire de Paris-Meudon (France).
THE WIND AND CHROMOSPHERE OF THE HERBIG Ae STAR AB AUR AS SEEN BY IUE
C. Catala *In* ESA Fourth European IUE Conf. Jul. 1984 p 227-231 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35175# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
MAGNETIC ACTIVITY IN LOWER MAIN SEQUENCE STARS
O. Vilhu *In* ESA Fourth European IUE Conf. Jul. 1984 p 239-242 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35183# University Coll., London (England).
LIMB-DARKENING AND METAL ABUNDANCES IN THE SDOB PRIMARY OF THE ECLIPSING BINARY LB 3459 (AA DOR)
A. E. Lynas-Gray, U. Heber (Kiel Univ.), R. P. Kudritzki (Universitaets Sternwarte, Munich), and K. P. Simon (Universitaets Sternwarte, Munich) *In* ESA Fourth European IUE Conf. Jul. 1984 p 285-189 refs Sponsored by UK Science and Engineering Research Council (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35184# European Space Agency, Madrid (Spain). Villafranca Satellite Tracking Station.
FLUX VARIATIONS OF 88 Her THROUGH PHASE TRANSITION FROM FAR UV TO VISUAL
M. Barylak and V. Doazan (Observatoire de Paris) *In its* Fourth European IUE Conf. Jul. 1984 p 291-295 refs Sponsored by ESOC (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35189# Astronomical Inst., Utrecht (Netherlands). Space Research Lab.
SHELL EJECTION PHENOMENA IN THE HYPERGIANT STAR P CYGNI
H. J. G. L. M. Lamers, P. Korevaar, and A. Cassatella (ESA, Madrid) *In* ESA Fourth European IUE Conf. Jul. 1984 p 315-317 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35192# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Astronomy.
THE NITROGEN ABUNDANCE IN WC STARS
W. Schmutz, C. Morossi (Osservatorio Astronomico, Trieste), and M. Ramella (Osservatorio Astronomico, Trieste) *In* ESA Fourth European IUE Conf. Jul. 1984 p 325-327 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35194# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
MASS LOSS FROM THE CENTRAL STAR OF NGC 3242
W.-R. Hamann, R.-P. Kudritzki (Universitaets Sternwarte, Munich), R. H. Mendez (Instituto de Astronomia y Fisica del Espacio), and S. R. Pottasch (Kapteyn Astronomical Inst.) *In* ESA Fourth European IUE Conf. Jul. 1984 p 333-336 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35195# University Coll., London (England).
A MODEL OF THE PLANETARY NEBULA NGC 3918 BASED ON IUE OBSERVATIONS
R. E. S. Clegg, J. P. Harrington (Maryland Univ.), and M. J. Barlow *In* ESA Fourth European IUE Conf. Jul. 1984 p 337-340 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35196# Armagh Observatory (Northern Ireland).
ROTATIONAL MODULATION OF SPOTS AND PLAGES ON RSCVn STARS
P. B. Bryne, J. G. Doyle, A. D. Andrews, C. J. Butler, N. C. Marstad (Joint Inst. for Laboratory Astrophysics), J. L. Linsky (Joint Inst. for Laboratory Astrophysics), T. Simon (Joint Inst. for Laboratory Astrophysics), M. Rodono (Catania Univ.), S. Catalano (Catania Univ.), C. Blanco (Catania Univ.) et al *In* ESA Fourth European IUE Conf. Jul. 1984 p 343-349 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35197*# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
MODELS FOR THE ACTIVE AND QUIESCENT REGIONS ON THE RS CVN-TYPE SYSTEM 2 PEGASI (HD 224085)
J. L. Linsky, A. Brown, N. C. Marstad, M. Rodono (Catania Univ.), A. D. Andrews (Armagh Observatory), C. J. Butler (Armagh Observatory), and P. B. Byrne (Armagh Observatory) *In* ESA Fourth European IUE Conf. Jul. 1984 p 351-354 refs (For primary document see N84-35135 24-88)
(Grant NAG5-82)
Avail: NTIS HC A23/MF A01 CSCL 03B

N84-35201# Kiel Univ. (West Germany). Inst. fuer Theoretische Physik und Sternwarte.
AN ESTIMATE OF V348 Sgr EFFECTIVE TEMPERATURE
U. Heber, A. Heck (Observatoire de Strasbourg), L. Houziaux (Institut d'Astrophysique, Liege), J. Manfroid (Institut d'Astrophysique, Liege), and D. Schoenberner *In* ESA Fourth European IUE Conf. Jul. 1984 p 367-370 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35203# Cambridge Univ. (England). Inst. of Astronomy.
DWARF NOVAE THROUGH THE OUTBURST CYCLE
J. E. Pringle and F. Verbunt *In* ESA Fourth European IUE Conf. Jul. 1984 p 377-383 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35204# European Space Agency, Madrid (Spain). IUE Satellite Tracking Station.
THE OUTBURSTS OF DWARF NOVAE

B. J. M. Hassall *In its* 4th European IUE Conf. Jul. 1984 p 385-386 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35205# Cambridge Univ. (England). Inst. of Astronomy.
CONSTRAINTS ON STELLAR WINDS OF CATACLYSMIC VARIABLES DERIVED FROM ULTRAVIOLET RESONANCE LINES
J. E. Drew and F. Verbunt *In* ESA 4th European IUE Conf. Jul. 1984 p 378-389 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35206# Consiglio Nazionale delle Ricerche, Frascati (Italy). Inst. di Astrofis.
SS CYGNI: ACCRETION DISK MORPHOLOGY
F. Giovannelli, C. Bartolini (Bologna Univ., Italy), P. Candy (Bologna Univ., Italy), S. Guadenzi (Rome Univ., Italy), A. Guarnieri (Bologna Univ., Italy), R. Lombardi (Rome Univ., Italy), and A. Piccioni *In* ESA 4th European IUE Conf. Jul. 1984 p 391-393 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35208# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Astronomy.
TWO DENSITY COMPONENTS IN SYMBIOTIC STARS
W. Deuel and H. Nussbaumer *In* ESA 4th European IUE Conf. Jul. 1984 p 399-402 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35209# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. Astrofisica.
A NEW OUTBURST OF Z ANDROMEDAE
R. Viotti, A. Cassatella (ESA, Madrid), and A. Altamore (Rome University, Italy) *In* ESA 4th European IUE Conf. Jul. 1984 p 403-406 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35213# Osservatorio Astronomico, Trieste (Italy).
A STUDY OF MASS ACCRETION IN ALGOL FROM HIGH RESOLUTION IUE SPECTRA
H. Cugier (Wroclaw Astronomical Observatory, Poland) and P. Molaro *In* ESA 4th European IUE Conf. Jul. 1984 p 415-418 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35217# Observatoire de Paris-Meudon (France).
ULTRAVIOLET ORBITAL VARIABILITY OF THE INTERMEDIATE POLARS
M. Mouchet and J. M. Bonnet-Bidaud (Centre d'Etudes Nucleaires, Saclay, France) *In* ESA 4th European IUE Conf. Jul. 1984 p 431-434 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35220# Amsterdam Univ. (Netherlands). Inst. of Astronomy.
EVIDENCE FOR VARIATIONS IN THE PHASE-DEPENDENT IONIZATION STRUCTURE OF THE STELLAR WIND IN VELA X-1
M. vanderKlis and G. Hammerschlag-Hensberge *In* ESA 4th European IUE Conf. Jul. 1984 p 443-447 refs Sponsored by Netherlands Organization of Research (ZWO) (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35232# Leiden Univ. (Netherlands). Lab. of Astrophysics.
A COMPREHENSIVE ULTRAVIOLET EXTINCTION STUDY: GRAIN MODEL AND GRAIN EVOLUTION IMPLICATIONS
G. Chlewicki, J. M. Greenberg, S. Aiello (Florence University), B. Barsella (Pisa University), P. Patriarchi (Osservatorio Astrofisico di Acreti, Florence), and M. Perionotto (Osservatorio Astrofisica di Acreti, Florence) *In* ESA 4th European IUE Conf. Jul. 1984 p 507-510 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

N84-35233# Science Research Council, Chilton (England). Astrophysics Group.
PHASE-DEPENDENT STELLAR WIND ABSORPTIONS IN INTERACTING WOLF-RAYET BINARIES
G. E. Bromage *In* ESA 4th European IUE Conf. Jul. 1984 p 511-513 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N84-35241*# Brigham Young Univ., Provo, Utah.
PIONEER 10 AND 11 (JUPITER AND SATURN) MAGNETOMETER EXPERIMENT Semiannual Progress Report, 1 Apr. - 30 Sep. 1984
Douglas E. Jones 5 Sep. 1984 3 p
(Grant NAG2-145)
(NASA-CR-174006; NAS 1.26:174006) Avail: NTIS HC A01/MF A01 CSCL 03B

The interaction of a flowing plasma with Titan was studied. A Monte carlo simulation method is planned for the determination of the average flow field and pressure/temperature variations about Titan. Jupiter's magnetic field was also studied. Polynomial expressions describing this magnetic field are discussed briefly.
R.S.F.

N84-35242*# National Aeronautics and Space Administration, Washington, D. C.
VOYAGER 1 AND 2 ATLAS OF SIX SATURNIAN SATELLITES
Raymond M. Batson et al 1984 175 p refs Original contains color illustrations
(NASA Order WO-8395; NASA Order W-13709)
(NASA-SP-474; NAS 1.21:474; LC-84-11580) Avail: NTIS HC A08/MF A01 CSCL 03B

Maps, compiled with data gathered primarily by Voyager 1 and 2 spacecraft, are presented which show the diversity among six of the Saturnian moons. Mimas and Enceladus are mapped in detail. Prelimary maps are given for the other four satellites. Diameter, density, albedo, and distance from mother planet, among much more data, is given for each moon. E.R.

N84-35243*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PLASMA ELECTRON ANALYSIS: VOYAGER PLASMA SCIENCE EXPERIMENT
Edward C. Sittler, Jr. May 1983 51 p refs
(NASA-TM-85037; NAS 1.15:85037) Avail: NTIS HC A04/MF A01 CSCL 03B

The Plasma Science Experiment (PLS) on the Voyager spacecraft provide data on the plasma ions and electrons in the interplanetary medium and the magnetospheres of the giant planets Jupiter and Saturn. A description of the analysis used to obtain electron parameters (density, temperature, etc.) from the plasma science experiment PLS electron measurements which cover the energy range from 10 eV to 5950 eV is presented. The electron sensor (D cup) and its transmission characteristics are described. A derivation of the fundamental analytical expression of the reduced distribution function F(e) is given. The electron distribution function F(e), used in the moment integrations, can be derived from F(e). Positive ions produce a correction current (ion feedthrough) to the measured electron current, which can be important to the measurements of the suprathermal electron component. In the case of Saturn, this correction current, which can either add to or subtract from the measured electron current, is less than 20% of the measured signal at all times. Comments about the corrections introduced by spacecraft charging to the Saturn encounter data,

which can be important in regions of high density and shadow when the spacecraft can become negatively charged are introduced. M.A.C.

N84-35244*# Wisconsin Univ., Madison.
CLOUD AND ICE IN THE PLANETARY SCALE CIRCULATION AND IN CLIMATE Final Report, 1 Jan. 1977 - 30 Jan. 1983
Gerald F. Herman, David D. Houghton, John E. Kutzbach, and Verner E. Suomi 19 Oct. 1984 96 p refs
(Grant NaG-5152)
(NASA-CR-173992; NAS 1.26:173992) Avail: NTIS HC A05/MF A01 CSCL 03B

The roles of the cryosphere, and of cloud-radiative interactions are investigated. The effects clouds and ice have in the climate system are examined. The cloud radiation research attempts explain the modes of interaction (feedback) between raditive transfer, cloud formation, and atmospheric dynamics. The role of sea ice in weather and climate is also discussed. Models are used to describe the ice and atmospheric dynamics under study. M.A.C.

N84-35245# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LONG TIME BEHAVIOUR OF THE INTERPLANETARY MAGNETIC FIELD-SECTORIAL STRUCTURE
A. L. C. Gonzalez and W. D. Gonzalez Aug. 1984 15 p refs Presented at the SBPC Meeting, Sao Paulo, Brazil, 1984 Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Technologico
(INPE-3222-PRE/573) Avail: NTIS HC A02/MF A01

The behavior of the interplanetary magnetic field (IMF) polarity was analyzed from data covering the years 1926 to 1982. The data refer to daily values of the IMF polarity, which is defined as being away or toward, according to the predominat direction of the magnetic field along the Archimedes Spiral. In order to find possible periodicities, the data were submitted to power spectrum analysis, both in their totality and also grouped in shorter time intervals. The results show that, although on a large temporal scale the IMF seems to have a structure composed of two approximately equal sectors with opposite polarities, this configuration is not unique. On the contrary, from a subdivision of the data in annual intervals, it is seen that epochs with quasi-symmetric bi-sectorial structures are followed, with recurrences of 1.5 to 3 years by epochs with less defined structures or even with quasi-symmetric four-sectors, thus explaining the apparent controversy concerning the basic features of the IMF-polarity structure. Author

N84-35246# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
METEOR SHOWERS EFFECTS IN THE LOW TERRESTRIAL IONOSPHERE DETECTED AT VLF IONOSONDE AND LONG DISTANCE PROPAGATION PATHS
J. W. S. VilasBoas, N. M. PaesLeme, L. R. Piazza, and M. S. S. MacedoMoura (Inst. de Atividades Espaciais) Aug. 1984 18 p refs Submitted for publication
(INPE-3242-PRE/568) Avail: NTIS HC A02/MF A01

The effect of Geminids and eta Aquarids meteor showers in the lower ionosphere were observed using two different methods. Low ionosphere group heights measured by a very low frequency ionosonde located south of Brazil indicated an anomalous lowering of the effective reflection height and presented night-time 5 sigma deviation in good correlation with Eta Aquarids stream transit. The group reflection coefficients present a very pronounced variation reaching values 3 sigma below the normal values. Diurnal very low frequency phase variations in two long-distance propagation paths present night-time 7 sigma and 4 sigma phase deviations from the average during the Eta Aquarids shower transit. The Geminids shower effect in the lower ionosphere was detected in two different long distance very low frequency propagation paths: NAA, Culter, U.S.A. - Atibaia, S.P., Brazil presented 5 sigma phase deviation and ARG, Argentina - Atibaia, S.P., Brasil presented 3.5 sigma phase deviation from the average. The geomagnetic activity in the periods covered by this investigation was low and the results obtained are a confirmation through two different techniques of changes in the physical conditions of the low ionosphere by meteor shower. Author

N84-35247# Oulu Univ. (Finland). Dept. of Astronomy.
PLANETARY TECTONICS
J. Raitala [1984] 5 p refs
Avail: NTIS HC A02/MF A01

Several possibilities concerning tectonic force deformation of a planetary crust are discussed: (1) rapid rotation and accompanying flattening may be difficult to trace afterwards as reshaping also due to (2) despinning and (3) tidal forces (if the planet was still hot enough during the slowing of the rotation and tidal deformations). The excess of internal energy (4) may have caused extensional global or areal effects as well as (5) the cooling which leads to compressional crustal structures. Impacts of (6) major ones have been important as also (7) the existence of mascons. Volcanic loading and the drying up of magma (8) may have also been important like (9) volcanic stresses as lunar mare areas, and the convecting Earth. S.B.

N84-35248*# National Aeronautics and Space Administration, Washington, D. C.
ON MARS: EXPLORATION OF THE RED PLANET, 1958 - 1978
Edward Clinton Ezell, ed. and Linda Neuman Ezell, ed. 1984 545 p refs Original contains color illustrations
(NASA-SP-4212; NAS 1.21:4212; LC-82-22302) Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

The exploration of Mars is covered by the following topics: Mariner spacecraft and launch vehicles, search for Martian life; Voyager spacecraft; creation of Viking; Viking Orbiter and its Mariner inheritance; Viking lander; building a complex spacecraft; selecting landing sites; site certification, and data from Mars. For individual titles, see N84-35249 through N84-35259.

N84-35249*# National Aeronautics and Space Administration, Washington, D. C.
WHY MARS?
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 1-24 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

The possibility of life on Mars, clues to the evolution of the solar system, fascination with the chemistry, geology, and meteorology of another planet led the National Aeronautics and Space Administration to Mars. Project Viking's goal, after making a soft landing on Mars, was to execute a set of scientific investigations that would not only provide data on the physical nature of the planet but also make a first attempt at determining if detectable life forms were present. B.G.

N84-35250*# National Aeronautics and Space Administration, Washington, D. C.
THE CART BEFORE THE HORSE: MARINER SPACECRAFT AND LAUNCH VEHICLES
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 1-24 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

Evolution of unmanned space exploration (Pioneer, Ranger, Surveyor, and Prospector) up to 1960, and the problems in the design and use of the Atlas Centaur launch vehicle were discussed. The Mariner Program was developed from the experience gained from the previous unmanned flights. B.G.

N84-35251*# National Aeronautics and Space Administration, Washington, D. C.
THE SEARCH FOR MARTIAN LIFE BEGINS, 1959 - 1965
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 51-82 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL

03B

When the Viking spacecraft was launched to Mars in 1975, three biological experiments and a gas chromatograph-mass spectrometer, instruments with an intellectual and technological history reaching back to the early days of American space science, were on board. A systematic study of the evolution of the Martian surface and atmosphere was conceived with the following goals: (1) determination of the physical and chemical conditions of the martian surface as a potential environment for life; (2) determination whether life is or was present on Mars; (3) determination of the characteristics of that life, if present; and (4) investigation of the pattern of chemical evolution without life. B.G.

N84-35252*# National Aeronautics and Space Administration, Washington, D. C.
VOYAGER: PERILS OF ADVANCED PLANNING, 1960 - 1967
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 83-120 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

Contract proposals; phased project planning; budgetary problems; Saturn 1 B-Centaur versus Saturn V; mission guidelines and management assignments; and the origins of the Voyager project are discussed. B.G.

N84-35253*# National Aeronautics and Space Administration, Washington, D. C.
REORGANIZATION AND CREATION OF VIKING
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 121-154 (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

The cancellation of Voyager caused NASA to rethink its slate of proposed planetary missions. A set of alternatives was developed for planetary investigations among which was the Viking program. The problems of management assignments and budgets are discussed. B.G.

N84-35254*# National Aeronautics and Space Administration, Washington, D. C.
VIKING ORBITER AND ITS MARINER INHERITANCE
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 155-202 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

Improvements to the design of the Mariner spacecraft resulted in the Viking spacecraft. The Viking spacecraft would consist of two major systems - an orbiter and a lander, while the lander would provide the means for safely delivering the scientific instruments to the surface, house, and provide the necessary power source and communication links for those experiments, the orbiter would transport the lander to Mars, rovide a platform for the Viking imaging system so that proposed landing sites could be surveyed and certified, relay lander science information back to Earth, and conduct scientific observations in its own right. B.G.

N84-35255*# National Aeronautics and Space Administration, Washington, D. C.
VIKING LANDER: CREATING THE SCIENCE TEAMS
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 203-242 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

The teams of scientists and the contractors involved in designing and fabricating the Viking lander spacecraft for Mars exploration are discussed. The requirements established for each member of the research teams are enumerated and the personnel selection process is described. Two instruments for the lander, a gas chromatograph-mass spectrometer and a biology life detection instrument, are addressed in terms of costs, design, planning, and subcontractors. The challenges and ultimate success of the research management efforts are related in detail. R.S.F.

N84-35256*# National Aeronautics and Space Administration, Washington, D. C.
VIKING LANDER: BUILDING A COMPLEX SPACECRAFT
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 243-276 (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

Various aspects of the design, testing, and preparation of the Viking lander spacecraft for Mars exploration are considered. The mission profile is given, including the entry into the Martian atmosphere and landing on the planet's surface. The return of scientific data to Earth is discussed. The top ten problem areas in the Viking lander project are enumerated, as are project costs. Pre-launch performance tests and preparation procedures are also addressed. R.S.F.

N84-35257*# National Aeronautics and Space Administration, Washington, D. C.
SAFE HAVENS: SELECTING LANDING SITES FOR VIKING
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 277-316 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4

The involved process by which a landing site on the Martian surface was selected for the Viking lander spacecraft is reviewed. Spacecraft survivability had to be weighed against having the lander touch down in an area of little scientific value. The mission of Mariner 9 is discussed and imagery of Mars generated by this space probe is presented. R.S.F.

N84-35258*# National Aeronautics and Space Administration, Washington, D. C.
SITE CERTIFICATION AND LANDING
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 317-362 refs (For primary document see N84-35248 24-91)
Avail: NTIS HC A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

The process by which the landing site for the Viking lander spacecraft was certified is described. Soviet attempts to investigate Mars using the Mars class spacecraft are reviewed. Radar as a tool to study planetary surfaces is discussed. The launch and flight of Viking 1 are recounted. The challenges and success of soft landing of the Viking lander on the Martian surface are described. R.S.F.

N84-35259*# National Aeronautics and Space Administration, Washington, D. C.
ON MARS
In its On Mars: Exploration of the Red Planet, 1958 - 1978 1984 p 363-420 refs (For primary document see N84-35248 24-91)
Avail: NTIS MF A01; SOD HC $20.00 as 033-000-00869-4 CSCL 03B

The following aspects of the planet Mars were assessed directly and indirectly by the Viking lander and Viking orbiter spacecraft: the atmosphere, craters, volcanoes, terrain, geology, and evolution. Descriptions of these aspects are included herein. It is concluded that though life is certainly not abundant on Mars, the possibility still exists that some form of life is extant there. R.S.F.

N84-35260*# National Aeronautics and Space Administration, Washington, D. C.
METEORITE BOMBARDMENT AND DATING OF PLANETARY SURFACES Thesis - Feb. 1983
G. Neukum Sep. 1984 159 p refs Transl. into ENGLISH of "Meteoritenbombardement und Datierung Planetarer Oberflaechen" Munich, Feb. 1983 p 1-186 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)

(NASA-TM-77558; NAS 1.15:77558) Avail: NTIS HC A08/MF A01 CSCL 03B

Dating by measurement of impact crater frequencies developed in the past years primarily on the basis of the data from the missions to the Moon and Mars. The method allows a good relative dating to be obtained and the moons of Jupiter and Saturn through photographic analyses. A cratering chronology was obtained for the period between the oldest Moon crust (4.3 to 4.4 billion years) to the present time which gives a good absolute dating of any areas of the Moon's surface. Author

N84-35261*# Cornell Univ., Ithaca, N.Y. Center for Radiophysics and Space Research.

PARTICIPATION IN THE MARS DATA ANALYSIS PROGRAM: GLOBAL AND REGIONAL STUDIES OF WIND-INDICATORS ON THE SURFACE OF MARS Final Technical Report

Joseph Veverka and Peter Thomas Oct. 1984 8 p refs (Grant NaG-7546)

(NASA-CR-173982; NAS 1.26:173982) Avail: NTIS HC A02/MF A01 CSCL 03B

Global and regional patterns on Mars were inferred from surface aeolian features, such as wind streaks and dune deposits, which were visible in Viking Orbiter images. Precise measurements of the dimensions of topographic obstacles, i.e., craters, hills, ridges, on Mars as well as their associated wind streaks were used to determine the aerodynamic shape of an obstacle affects near surface airflow. A classification of Martian wind streaks was developed on the basis of albedo contrast and the presence or absence of either topographic obstacles or sediment deposits at the point of origin of the wind streaks. It was concluded that local meteorological conditions, such as the stability of the atmospheric boundary layer, play a major role in determining why some Martian craters produce depositional wind streaks while others produce erosional ones. E.R.

N84-35262*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

WET MODEL OF SATURN'S IONOSPHERE: WATER FROM THE RINGS

J. E. P. Connerney and J. H. Waite Jun. 1984 17 p refs

(NASA-TM-86144; Rept-695; NAS 1.15:86144) Avail: NTIS HC A02/MF A01 CSCL 03B

Current theoretical models of Saturn's ionosphere are difficult to reconcile with the ionospheric electron density profiles obtained from the Pioneer and Voyager radio occultation observations and the large diurnal variation of maximum ionospheric electron density deduced from studies of Saturn lightning discharges. A model of Saturn's ionosphere is proposed in which water plays a major role as a minor constituent present by virtue of downward diffusion from an external source. This model of the Saturn ionosphere is a classical 'F2' type layer resulting from the photodissociative production of H(+) from H2 and rapid chemical loss due to a series of charge exchange reactions with water. A planet-wide influx of about 4x10 to the 7th power molecules/sec/sq cm of water from the rings is consistent with the observed ionospheric electron densities and estimates of influx due to micrometeoride bombardment of the rings. An enhanced influx of water occurs at latitudes (-38 deg, +44 deg) magnetically connected to the inner edge of Saturn's B ring which results from an electromagnetic erosion process contributing substantially to the (local) upper atmosphere water content. Present day influx at these latitudes is possibly as large as 2x10 to the 9th power molecules/sec/sq cm. Author

N84-35223# Kent Univ., Canterbury (England). Space Sciences Lab.

ANALYSIS OF HYDROXYL DATA FROM COMET AUSTIN 1982G

Max. K. Wallis, William C. Carey, David W. Hughes (Sheffield University, UK), and William M. Burton (Science Research Council, Chilton, UK) *In* ESA 4th European IUE Conf. Jul. 1984 p 459-462 refs Sponsored by UK Science and Engineering Research Council

(For primary document see N84-35135 24-88)

Avail: NTIS HC A23/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N84-35263 Yale Univ., New Haven, Conn.

RESONANT 3-WAVE INTERACTIONS AND AN APPLICATION TO THE 160 MINUTE SOLAR OSCILLATION Ph.D. Thesis

David Bruce Guenther 1983 136 p

Avail: Univ. Microfilms Order No. DA8413087

The nonlinear ordinary differential equations, which describe resonant three-wave interactions, are derived. The equations are obtained from the nonradial adiabatic stellar pulsation equations by the method of variation of constants Coupling coefficients are determined for the velocity dot velocity gradient term of the momentum equation. The equations are solved numerically for several cases involving the solar 160 minute g mode oscillation. The solutions indicate that the lowest order g modes can couple together to enhance their amplitudes. Interactions involving modes, whose periods are longer than 170 minutes, are found to exhibit erratic behavior. The observed g mode oscillation spectrum of the Sun is compared with a plot of the number of possible resonant three-wave interactions of theoretical g modes at a given period versus the frequency difference of the coupled modes. Peaks in the curve area found to coincide with recently identified g mode data. A very large peak is also found near 160 minutes.

Dissert. Abstr.

N84-35264*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

A NEW CLASS OF SOLAR BURST WITH MM-WAVE EMISSION BUT ONLY AT THE HIGHEST FREQUENCY (90 GHz)

P. Kaufmann (Inst. de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), E. Correia (Inst. de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), J. E. R. Costa (Inst. de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), A. M. Zodi Vaz (Inst. de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), and B. R. Dennis Aug. 1984 14 p refs Submitted for publication Sponsored in part by FINEP

(NASA-TM-87369; NAS 1.15:87369; INPE-3241-PRE/587) Avail: NTIS HC A02/MF A01 CSCL 03B

High sensitivity and high time resolution solar observations at 90 GHz (lambda = 3.3 mm) have identified a unique impulsive burst on May 21, 1984 with emission that was more intense at this frequency than at lower frequencies. The first major time structure of the burst was over 10 times more intense at 90 GHz than at 30 GHz, 7 GHz, or 2.8 GHz.Only 6 seconds later, the 30 GHz impulsive structures started to be observed but still with lower intensity than at 90 GHz. Hard X-ray time structures at energies above 25 keV were almost identical to the 90 GHZ structures (to better than one second). All 90 GHz major time structures consisted of trains of multiple subsecond pulses with rise times as short as 0.03 sec and amplitudes large compared to the mean flux. When detectable, the 30 GHz subsecond pulses had smaller relative amplitude and were in phase with the corresponding 90 GHz pulses. R.S.F.

N84-35265*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

STUDIES OF SOLAR MAGNETIC FIELDS DURING THE SOLAR MAXIMUM YEAR

M. J. Hagyard Sep. 1984 60 p refs

(NASA-TM-86469; NAS 1.15:86469) Avail: NTIS HC A04/MF A01 CSCL 03B

Observations and studies of solar magnetic fields that were carried out during the period of the solar maximum year (SMY) January 1980 to June 1981, are reviewed with the goal of providing a summary of what was learned about solar magnetic fields during

the SMY. Such subjects as the relationship between solar magnetic fields and flares, the role of magnetic fields in the sunspot phenomenon, the magnetic-canopy structure overlying the supergranular network as well as the turbulent magnetic fields within the network, the fields within the polar crown prominences, and the solar magnetic cycle are addressed. Author

N84-35266# Alaska Univ., Fairbanks. Geophysical Inst.
A NUMERICAL SIMULATION STUDY OF SOLAR WIND DISTURBANCES RESPONSIBLE FOR GEOMAGNETIC AND AURORAL STORMS Final Report, 11 Dec. 1980 - 11 Nov. 1983
S. I. Akasofu 31 Jan. 1984 39 p
(Contract F19628-81-K-0024)
(AD-A144178; AFGL-TR-84-0048) Avail: NTIS HC A03/MF A01 CSCL 03/2

During the last 12 months, we have made significant progress in three areas, (1) the simulation of propagation of flare-generated shock waves; (2) dynamo processes associated with solar flares; and (3) the simulation of sunspot formation. During the next 12 months, we plan to extend our studies in the same three areas. Some of the highlights and the future plans are described. Specifically, we have constructed a code to deal with the propagation of shock waves generated by six successive flares and plan to study several observed events on the basis of the code. We have developed a dynamo theory of the solar flares and plan to simulate time-dependent models by a MHD simulation method. We plan to examine observed velocity fields around sunspots in connection with our dynamo theory of solar flares. It is also our plan to extend our simulation study of sunspots by including magnetic buoyancy and other factors. Topics also include a solar wind study by the kinematic simulation method, and a study of the relationship between sunspot fields and transient IMF (Intermediate Magnetic Field) variations. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N84-35267 Academy of Sciences (USSR), Moscow.
COSMIC RAYS, NO. 23. RESULTS OF RESEARCHES ON THE INTERNATIONAL GEOPHYSICS PROJECTS
1983 78 p refs In ENGLISH and RUSSIAN
Copyright. Avail: Issuing Activity

The spectral characteristics of cosmic rays are discussed. Variations of the energy spectra are calculated and the relationship between perturbation and solar activity is investigated. For individual titles, see N84-35268 through N84-35279.

N84-35268# Academy of Sciences (USSR), Moscow.
ABOUT THE FORMATION OF PARTICLE ENERGY SPECTRUM BY THE STATISTICAL MECHANISM OF PARTICLE ACCELERATION: THE CHARACTER OF PARTICLE ENERGY GAIN IN THE STATISTICAL ACCELERATION MECHANISM
L. I. Dorman *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 5-13 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The extensively used idea that the energy gain and loss in the head-on and overtaking collisions are the same has been shown to be erroneous. The idea that the particle energy gain in the statistical acceleration mechanism is due to the difference in frequencies of the head-on and overtaking collisions has also proved erroneous since this difference diminishes rapidly with increasing energy and, therefore, gets infinitesimal in the ultrarelativistic energy range. The energy gain in the head-on collisions is systematically in excess of the energy loss in the analogous overtaking collisions. M.A.C.

N84-35269# Academy of Sciences (USSR), Moscow.
SPECTRAL CHARACTERISTICS OF COSMIC RAY FLUCTUATIONS
I. Ya. Libin *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 14-19 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The results of ground based observations of cosmic ray intensity with a scintillation telescope, a muon telescope, and neutron monitors are used to calculate the power spectra of cosmic ray intensity fluctuations on the Earth's surface in various periods of solar and geomagnetic activity. The use of the calculated spectra to obtain the sampled relative spectral estimates permits a significant improvement in the sensitivity of the spectra. M.A.C.

N84-35270# Academy of Sciences (USSR), Moscow.
JOINT ANALYSIS OF THE DATA OBTAINED BY DETECTING THE GENERAL, MUON, AND NEUTRON COMPONENTS OF COSMIC RAY INTENSITY ON MAY 7, 1978
O. V. Gulkinsky, I. Ya. Libin, F. A. Starkov, A. M. Sitnov, Kh. M. Khamirsov, A. A. Chechenov, L. D. Shoya, and K. F. Yudakhim *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 20-25 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The data of cosmic ray observations with the IZMIRAN omnidirectional supertelescope and other instruments are presented. The 5-min detection data are used to calculate the mutual and auto-spectra of the fluctuation power of cosmic ray intensity for the general, muon, and neutron components. The appearance and formation dynamics of the 17-25-min and 40-60-min fluctuations are shown to be inherent to flare events. M.A.C.

N84-35271# Academy of Sciences (USSR), Moscow.
CALCULATIONS OF THE AMPLITUDE SPECTRUM OF THE 27-DAY VARIATIONS OF GALACTIC COSMIC RAYS
B. D. Naskidashvili and L. Kh. Shatashvili *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 26-29 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

An equation for the transportation of the Galactic cosmic rays in the solar wind with azimuthal (by velocity) asymmetry is analyzed. Spectrum of 27-day variations of the Galactic cosmic rays for different heliocentric distances in space is theoretically computed. The spectrum shows insignificant deviation from the degree dependence in the energy range of 3-200 GeV with average degree marker 0.7, which coincides with the experimental value for Solar activity maximum. M.A.C.

N84-35272# Academy of Sciences (USSR), Moscow.
LUNAR VARIATIONS OF COSMIC RAY INTENSITY
B. D. Naskidashvili and L. Kh. Shatashvili *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 30-32 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The results of the study of the lunar diurnal variations of the cosmic ray neutron component intensity using the data from the worldwide network of stations for two solar minima of 1964 and 1976 are presented. The difference in the variations is studied separately for the groups of stations in the northern and southern hemispheres. The dependences of the amplitude and phase of the first harmonic of the lunar variations on the geocentric distance of the Moon and on solar activity epoch are discussed. M.A.C.

N84-35273# Academy of Sciences (USSR), Moscow.
THE STUDY OF PECULIARITIES OF THE ENERGY SPECTRUM OF LOW ENERGY ELECTRONS IN THE LOWER ATMOSPHERE
T. N. Charakhchian, N. N. Volodichev, O. Yu. Nechaev, and I. A. Savenko *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 33-37 refs In RUSSIAN;

ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

Cosmic ray electrons were measured from 1975 to 1977 in the Pamirs in central Asia at altitudes 4000, 5000 and 6000 m over the sea level by gas discharge meters. The ratio of particles with 0.15 to 0.56 g/cm sq run and particles with 0.56 to 2.0 g/cm sq run turned out to be two times higher than the ratio determined for cosmic ray electrons from Tamm-Belenky equal-energy spectrum. Author

N84-35274# Academy of Sciences (USSR), Moscow.
A CROSSED SCINTILLATION SUPERTELESCOPE TO MEASURE THE MUON COMPONENT OF COSMIC RAY INTENSITY
M. V. Alaniya, T. V. Dzhapiashvili, G. G. Erkomaishvili, Z. B. Zobeknidze, I. I. Tuskiya, and L. Kh. Shatashvili *In its* Cosmic Ray No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 38-40 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The design of a crossed-scintillation supertelescope for detecting the cosmic ray muon component is proposed. The telescope has a total area of 27 sq m and consists of three identical double-coincidence units. Each detector is a 1 sq m plastic scintillator with diffuse reflector and a FEU-49B photomultiplier. Author

N84-35275# Academy of Sciences (USSR), Moscow.
THE DENSITY DISTRIBUTION OF GALACTIC COSMIC RAYS ALLOWING FOR THE GENERALIZED TENSOR OF ANISOTROPIC DIFFUSION AND FOR THE REAL DISTRIBUTION OF SOLAR ACTIVITY
M. V. Alaniya, R. T. Gushchina, and L. I. Dorman *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 41-46 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The anisotropic diffusion equation is solved in the steady state, two-dimensional case making allowance for the generalized anisotropic diffusion tensor and for the delay of the events in interplanetary space relative to solar events. The diffusion coefficient is assumed to depend on the real altitude distribution of solar activity and on the distance to the Sun. The density distribution of galactic cosmic rays in a broad energy range is shown to relate the direction of the solar magnetic field and to depend strongly on the form of the diffusion coefficient-solar activity relation. Author

N84-35276# Academy of Sciences (USSR), Moscow.
THE STUDY OF THE DYNAMICS OF THE ELECTRON FLUXES AND SPECTRA DURING SOLAR MINIMUM
N. F. Gorbunova, Yu. V. Mineev, and E. S. Spirkova *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 47-50 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The dynamics of the fluxes and spectra of electrons in several energy ranges and of 1 MeV protons was studied. Several increases of the fluxes in all energy ranges were detected. The energy spectra of a large increase were obtained and analyzed. The knee in the spectrum of E sub E = 0.8 to 1.0 MeV is indicative of the role of various mechanisms contributing to the total background energy spectrum. Author

N84-35277# Academy of Sciences (USSR), Moscow.
NONUNIFORMITY AND EFFECTIVENESS OF LIGHT COLLECTION IN A LARGE SCINTILLATION COUNTER OF IONIZING RADIATION
A. N. Alentyev, Ya. L. Blokh, and A. A. Chaikin *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 51-59 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The calculated and experimental values of the nonuniformity and effectiveness of light collection in a large scintillation counter are presented. The values are dependent upon the diffuse reflectivity of the inner surface of the light collector inner surface. The expected values are in a good agreement with experimental data. Author

N84-35278# Academy of Sciences (USSR), Moscow.
TWO LARGE DECREASES OF COSMIC RAY INTENSITY IN AUGUST AND SEPTEMBER, 1979
A. V. Belov, L. I. Dorman, E. A. Eroshenko, and A. A. Melkumyan *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 60-63 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

Two large decreases in the intensity of cosmic ray fluxes are examined. An enhancement of the solar--diurnal variation during the intensity decrease indicates an additional cosmic ray flux from the east. The cosmic ray variations are compared with the variations of solar activity which was in many respects determined in the studied period by three large long-lived active regions in the northern hemisphere of the Sun. Author

N84-35279# Academy of Sciences (USSR), Moscow.
ABOUT THE PROFILE OF COSMIC RAY INTENSITY INCREASE PRIOR TO FORBUSH-DECREASE
N. S. Kaminer, A. E. Kuzmicheva, and N. V. Mymrina *In its* Cosmic Rays No. 23. Results of Researches on the Intern. Geophys. Proj. 1983 p 64-66 refs In RUSSIAN; ENGLISH summary (For primary document see N84-35267 24-93)
Avail: Issuing Activity

The character of the temporal variations of the amplitude of the effect of the pre-Forbush decrease increase is studied depending on the character of the flare-ejected plasma motion. Author

N84-35280 California Univ., Berkeley.
SATELLITE OBSERVATIONS OF THE EXTREME ULTRAVIOLET AND FAR ULTRAVIOLET RADIATION FIELDS Ph.D. Thesis
Randy Alan Kimble 1983 141 p
Avail: Univ. Microfilms Order No. DA8413454

Observations of the astronomical extreme ultraviolet (EUV) and far ultraviolet (FUV) radiation fields are presented. Such observations are of interest because the principal sources expected (stellar photospheres and interstellar coronal gas) are seldom studied at these wavelengths and because the effects of EUB/FUV radiation upon the interstellar medium are substantial. The data were obtained with a spectrometer launched on board the P78-1 satellite. Results suggest that the FUV radiation field is dominated by a small number of bright early type stars. Limits are also derived on the properties of hot coronal gas in the interstellar medium. It is argued that the intensity of the sub-912-A radiation field is lower than implied by previous observations and predictions. Further, it is argued that the observed neutrality of the very local interstellar medium precludes the presence of a significant local EUV radiation field. Limits to the radiative lifetime of massive neutrinos are derived. Dissert. Abstr.

N84-35281*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SPATIAL FLUCTUATIONS IN THE DIFFUSE COSMIC X-RAY BACKGROUND Ph.D. Thesis
Richard Arrick Shafer May 1983 517 p refs
(Grant NGR-21-002-316)
(NASA-TM-85029; NAS 1.15:85029) Avail: NTIS HC A22/MF A01 CSCL 03B

The bright, essentially isotropic, X-ray sky flux above 2 keV yields information on the universe at large distances. However, a definitive understanding of the origin of the flux is lacking. Some fraction of the total flux is contributed by active galactic nuclei and clusters of galaxies, but less than one percent of the total is contributed by the > or approximately 3 keV band resolved sources, which is the band where the sky flux is directly observed. Parametric models of AGN (quasar) luminosity function evolution

are examined. Most constraints are by the total sky flux. The acceptability of particular models hinges on assumptions currently not directly testable. The comparison with the Einstein Observatory 1 to keV low flux source counts is hampered by spectral uncertainties. A tentative measurement of a large scale dipole anisotropy is consistent with the velocity and direction derived from the dipole in the microwave background. The impact of the X-ray anisotropy limits for other scales on studies of large-scale structure in the universe is sketched. Models of the origins of the X-ray sky flux are reviewed, and future observational programs outlined. Author

N84-35282# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
NONLINEAR TEMPORAL MODULATION OF PULSAR RADIO-EMISSION
Abraham C.-L. Chian Sep. 1984 17 p refs Submitted for publication
(INPE-3272-PRE/597) Avail: NTIS HC A02/MF A01

A nonlinear theory is discussed for self-modulation of pulsar radio pulses. A nonlinear Schroedinger equation is derived for strong electromagnetic waves propagating in an electron-positron plasma. The nonlinearities arising from wave intensity induced relativistic particle mass variation possibly excite the modulational instability of circularly and linearly polarized pulsar radiation. The reculting wave envelopes can take the form of periodic wave trains or solitons. These nonlinear stationary waveforms may account for the formation of pulsar microstructures. Author

N84-35283*# California Univ., San Diego.
LARGE SCALE SOLAR MODULATION OF < 500 MeV/N GALACTIC COSMIC RAYS SEEN FROM 1-30 AU
Walker Fillius and Ian Axford (Victoria Univ., Wellington, New Zealand) [1983] 18 p refs
(Grant NAG2-153)
(NASA-CR-173993; NAS 1.26:173993) Avail: NTIS HC A02/MF A01 CSCL 03B

Using measurements of cosmic rays obtained by Cerenkov counters on Pioneer 10 and Pioneer 11 and neutron monitor data from Earth, the spatial and temperal development of cosmic ray modulation during the last solar maximum were observed. The large-scale features of modulation and recovery are similar at these three sites and thus appear rotationally symmetric near the ecliptic plane. Outward propagating features characterize the radial dependence. The decline of the old cosmic ray cycle is marked by steplike decreases that propagate outward at nearly the solar wind velocity. During the start of the new cosmic ray cycle, recovery occurs first in the inner heliosphere and, after a lag comparable with that of the declining phase, appears later farther out. However, the direction of diffusive propagation is still inward, because the gradient remains positive. Forbush decreases are common at all three sites, and are evidently of great importance in understanding modulation. The largest decrease occurred during a short series of events in the summer of 1982 and had half the amplitude of the eleven year cycle. R.S.F.

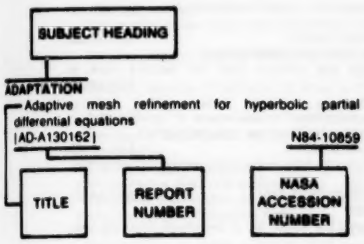
N84-35231# Rome Univ. (Italy). Dept. di Fisica.
SEARCH FOR THE RADIATIVE DECAY OF A COSMIC RELIC PARTICLE WITH IUE
F. Bochicchio, G. Auriemma, A. Frenkel, and F. Massa *In* ESA 4th European IUE Conf. Jul. 1984 p 503-505 refs (For primary document see N84-35135 24-88)
Avail: NTIS HC A23/MF A01

99 GENERAL

N84-35284# Office of Naval Research, London (England).
EUROPEAN SCIENTIFIC NOTES Monthly Publication
L. E. Shaffer Aug. 1984 51 p
(AD-A144223; ESN-38-8) Avail: NTIS HC A04/MF A01 CSCL 05/2

European Scientific Notes (ESN) is a monthly publication with brief articles on recent developments in European scientific research. The publication is not intended to be part of the scientific literature. The value of ESN articles to Americans is to call attention to current developments in European science and technology and to the institutions and people responsible for these efforts. ESN authors are primarily ONRL staff members. Occasionally articles are prepared by or in cooperation with staff members of the USAF European Office of Aerospace Research and Development or the US Army Research and Standardization Group. Qualified US scientists travelling in Europe may also be invited to author an ESN article. Author (GRA)

Typical Subject Index Listing



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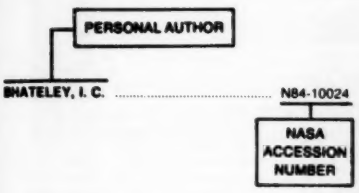

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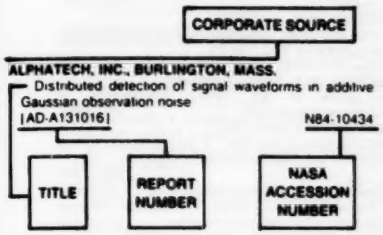

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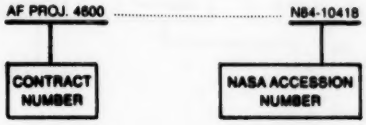

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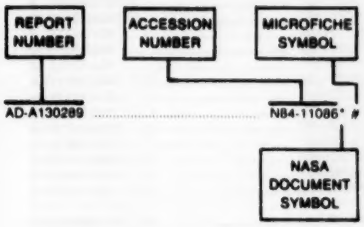

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